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THE OPERATIONS OF OBSTETRICS



# THE OPERATIONS OF OBSTETRICS

EMBRACING THE SURGICAL PROCEDURES AND MAN-  
AGEMENT OF THE MORE SERIOUS COMPLICATIONS

BY

FREDERICK ELMER LEAVITT, M.D.

FORMERLY ASSISTANT PROFESSOR OF OBSTETRICS AND GYNECOLOGY, UNIVERSITY  
OF MINNESOTA; OBSTETRICIAN TO THE CITY AND COUNTY HOSPITAL,  
THE ST. PAUL HOSPITAL, THE BETHESDA HOSPITAL, ETC.,  
ST. PAUL, MINNESOTA

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TO  
MY BROTHER  
SHELDON LEAVITT, M.D.  
WHOSE EXAMPLE AS A MAN AND PHYSICIAN  
HAS BEEN MY LIFELONG INSPIRATION  
I LOVINGLY DEDICATE THIS BOOK

**48260**



## PREFACE

Herewith is presented the subject of obstetrics from the operator's point of view, only enough pathology and physiology being introduced to give reason for and insight into the various procedures described. Treatment of the subject from this angle finds justification in the hope and belief that the general practitioner, as well as the specialist in obstetrics, will find such a book helpful.

While much of the material has been gathered from personal experience, the work represents, for the most part, the cumulated knowledge of many teachers and writers.

The engravings, without exception, are from specially prepared drawings made by the author, or by his artist, Mr. George M. Ericson.

F. E. LEAVITT.

St. Paul, Minnesota.





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 230. Hydrocephalus . . . . .  
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     catheter introduced through the . . . . .  
 232. Cross section of Fig. 231 . . . . .

# ART I

## GENERAL PROCEDURES

### CHAPTER I

#### GENERAL PREPARATIONS

##### DISINFECTION

Principles of asepsis apply to obstetric surgery that apply to general surgery, and should be observed with the same care. Usually, the parturient tract is self-protective, the danger to the patient is not disturbing this security except through unnecessary operations or from outside contamination. Beginning at the vulva and extending up the birth canal, the seriousness of infection progressively increases as it rises. Pyogenic microorganisms not only thrive better above than below, but the consequences of their activity are relatively more dangerous. In this respect obstetric surgery differs from general surgery. The site of operation frequently lies within or through a tract that cannot be easily aseptized.

Microorganisms reach this inviting field in two ways: (1) they may be carried there at time of labor through examination and manipulation, and (2) they may have found lodgment in the vagina or vulva before labor, only to become virulent from puerperal incubation. And no matter how exacting one may be, it is never possible to free the maternal parts absolutely of germs. It has been shown by Bumm that in three-fourths of his cases streptococci were found on the vulva and in the vagina. Generally speaking, these germs are harmless so long as they remain where they are and the tissues remain intact; but, when carried by the hand or instrument to a higher and less protected surface like the placental site, their activities at once become

gown, every  
disinfection  
See, et us con-

the hands and arms  
should never be  
sterile objects;  
immediately before  
the street clothes  
sleeved linen coat  
section is fastened a  
material. Finger  
arms bared to well

section are as follows:  
(1) Wash the hands with soap and  
water. (2) The soap used is not so important  
as the method of using it. Good soap can be man-  
aged, but really is no bet-  
ter than poor soap if used to advantage.  
(3) Scrub under the nails and  
between the fingers with a nail-cleaner; cut the  
nails close to the skin. (4) Wash  
the hands with water, using a sterile brush  
or towel. (5) Rub the  
hands with 70 per cent alcohol with a  
sterile towel. (6) Brush the hands  
with a sterile solution. The hands  
are then ready for gloves.

#### **Preparation and Sterilization of Rubber Gloves.**—The

gloves are washed with soap and warm  
water, then boiled for ten minutes.  
After boiling, they are taken out, and powdered freely  
with sterile powder, and then stuffed into the gloves,  
the meshes of which are  
thereby kept from  
contamination, and the impregnated  
gloves are ready for the hands when draw-  
ing the gauze must be withdrawn

from the gloves before they can be put on, and the hands must be dry. After the gloves have been washed, dried, and powdered as directed, they are wrapped in pairs and steam-sterilized. Prepared in this way gloves are always ready for use. Another and more common way is to boil the gloves for ten minutes just before operating. They are then drawn on wet, or, better still, full of water. Immersed in a lysol solution, the fingers become distended, and the glove pulls on easily. After the water is pressed out, folds in the rubber are easily smoothed out by stroking with a brush or piece of gauze.

**3. The Disinfection of the Patient.**—The patient should receive a full bath shortly before the onset of labor, or soon after it has begun. The entire body is soaped, except the genitalia. If the amniotic sac has ruptured, a full bath should not be given, at least not a tub bath. Particularly is the tub bath objected to for the multipara, with whom there may be considerable relaxation of the perineum. Where obtainable, the shower bath is preferable. A full bath would also be contraindicated in eclampsia, placenta previa, and severe internal diseases, such as heart affections and pneumonia. After the bath, the bowels should be emptied, a simple movement answering if the patient can defecate shortly before labor begins. A clyster is more to be relied upon, however; otherwise, one is never sure that the rectum has been thoroughly emptied; and, unless it is, delivery will be impeded, and fecal matter will be expelled at a time when cleanliness is particularly desirable.

**4. The Disinfection of the Genitals.**—Disinfection of the genitals is carried out as follows: (1) Remove the pubic and vulval hair. Clipping may answer, but shaving admits of more thorough disinfection. (2) With soap and warm water wash thoroughly the external parts, including the vulva, the anus, the inner surfaces of the thighs, and the lower part of the abdomen. A stiff brush should not be employed, but, instead, an ordinary wash-cloth, or a piece of gauze. (3) Rinse off the parts with sterile water. Ordinarily, this is sufficient disinfection, but it should include the vagina if there is much discharge.

Very often the operator himself completes these preparations while the patient is being anesthetized. When fully under the anesthetic, the vulva is thoroughly rubbed with gauze saturated



with alcohol, the bladder is catheterized and the vagina irrigated with a 1 per cent lysol solution. To insure thoroughness in the vaginal disinfection, the finger may accompany the douche point, and gently wash the parts out as the solution flows into the canal.

Upon completing the disinfection, the lower extremities and



Fig. 1.—Prepared for delivery. The parts have been shaved, and painted with iodine. Chloroform is being given, a few drops with each pain.

abdomen are covered with clean or, better still, sterile sheets, towels, or specially designed draperies (Fig. 1).

That such precautionary measures are followed by better results than formerly, when disinfection was practiced with indifference or neglected altogether, one has only to refer to statis-

tics in order to be convinced. Before the introduction of asepsis and antiseptics, the average mortality from puerperal infection in hospital practice was 3 per cent. Following the general introduction of more precise methods of disinfection, the mortality has been reduced to a fraction of 1 per cent. Formerly, one puerperal death occurred in every thirty-three women delivered, as compared with one in a thousand now. The percentage of morbidity was also high. Every tenth patient suffered an infection that ran a course only short of death. Proof that the hands and instruments are the conveyors of infection is strengthened by the fact that about 40 per cent of the women dying during the puerperium have undergone operations, which operations are to be regarded, not always, but frequently, as having been required by a pathologic condition demanding surgical intervention for her sake. The unfortunate ending, however, is charged to puerperal infection.

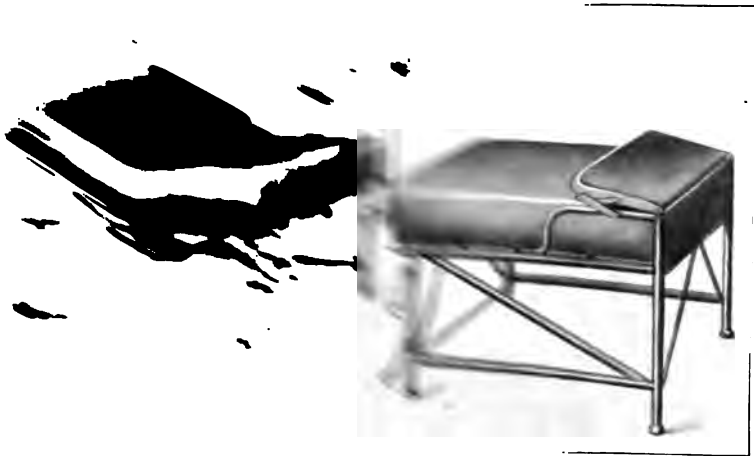
### **EQUIPMENT, POSTURE, ETC.**

Obstetrics as practiced in the hospital is far different from what it is when practiced in the private house. While the patient's home may be satisfactory in some instances, the hospital is so much better and safer that every woman should be urged to avail herself of its advantages. Some day it will be the exception rather than the rule for babies to be born at home. But until that time comes it will be necessary to apply, as far as possible, the same aseptic principles there as in the hospital. Useless pieces of furniture, heavy draperies, and all but the simplest ornamentation had better be removed for the occasion. There should be some provision made for artificial light that can be directed upon the introitus; and for this purpose a lamp with a reflector, preferably an electric light, is best adapted for the purpose.

**Delivery Bed.**—The delivery bed should be of plain metal, one-half to two-thirds as wide as the usual household bed. It should be of good height, fitted with stiff springs and a firm mattress, and stand free on both sides. After delivery the patient may lie in a more comfortable bed, the one she is accustomed to, if she prefers. The bed linen, as well as the linen of the patient, must be scrupulously clean and freshly laundered. Over the

piece of waterproof  
to extend several

allowing the delivery  
men. Two pieces  
are used, instead of  
the mattress  
a linen sheet,  
is overlaid with  
a linen. At the



is so constructed that the  
table and the patient easily

sheet, together with its  
as all soiled pads and  
the patient, leaving the  
discharge that may

as it is necessary to have  
except where a regular de-  
over the edge, the thighs  
possible to prepare the sur-  
ever operations may be in-  
is so constructed that the

patient's hips can be brought down to the foot, and the limbs held in proper position by means of stanchions attached to the bed (Fig. 2). A chair for the operator to sit on, a pillow under the patient's head, a large bowl or bucket under the edge of the bed to catch the discharges, and plenty of clean towels, are some of the things to have in readiness. And various kinds of pads for purposes of absorption are also in demand. There is no objection to the pneumatic pad, except that it is cumbersome to carry about. It is more essentially a part of hospital armamentarium. Any waterproof cloth folded in at the sides and top answers the purpose. After the scrubbing and disinfecting proc-



Fig. 3.—A twisted sheet used as a leg-holder.

ess is ended, nothing but sterile towels overlying an absorptive pad are to be used near the genital parts. The matter of light is important, and should be so arranged that it shines over the physician's shoulder as he sits facing the patient.

For all formidable procedures a regular operating table is of distinct advantage. Sometimes, however, it is necessary to make use of what comes to hand, impressing into service the dining or kitchen table. The chief advantage of the table, as compared with the bed, is its height and rigidity. Placed upon it, the legs of the patient are supported by two assistants who stand on either side of the table. In the absence of such help a sheet may be twisted into a rope, and carried around the patient's

ends are  
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 necessary in per-  
 enta. If the  
 shes to change  
 maneuver, it can  
 's leg over the  
 withdrawing his



FIGURE 1

employed to advantage dur-  
 though it can not be maintained  
 woman lies lengthwise, instead of  
 position is contraindicated in pla-  
 increased danger from embolism.

**Access to the Pelvis.** The high elevation of the pelvis  
 reposition maneuvers, such as the resto-  
 reposition, the release of an incarcerated retro-  
 replacing within the pelvis of a fallen loop  
 cord. The position is easily secured on the  
 by lowering the head to the Trendelenburg posi-  
 it can be secured by means of a common  
 placed on the table or bed that the knees of the

patient fall over the lower back round of the chair (Fig. 5). The chair first should be covered with a thick blanket and a clean sheet.



Fig. 5.—Trendelenburg position secured by means of a kitchen chair.



Fig. 6.—Knee-chest position.

**Knee-chest Position.**—The knee-chest position is especially useful in the more troublesome forms of funic prolapse. By it the fundus of the uterus sinks forward into the deepest part of the abdomen, thereby favoring the retention of the reposed part in

a safe position until the advancing head obstructs its further dislocation. The posture, on the other hand, induces a negative pressure in the abdomen, which greatly increases the difficulties of narcosis. (Fig. 6.)

**Walcher Hanging Position.**—The Walcher hanging position, also a very awkward one for a woman in labor to assume, has a limited use. Bringing the buttocks of the patient to the edge of the table, and allowing the feet to hang, will, it is calculated, increase the true conjugate three-fourths of a centimeter through rotating the sacrum on its iliac articulation. The posture finds its chief advantage, therefore, in flat pelves, and may, in certain cases, increase the diameters enough to allow the advancing or after-coming head to engage. (Fig. 7.)



Fig. 7.—Walcher hanging position.

## INSTRUMENTS

Obstetric instruments, the same as other surgical instruments, ought to be kept in a suitable cabinet. For convenience in carrying instruments, one should have a satchel large enough to accommodate all the instruments and appliances necessary for performing any obstetric operation that may arise. Such satchels are to be found in many varieties at the instrument dealers' ware-rooms. To be practical, the satchel or bag must be so planned that one can pack or unpack it quickly. I have found it very convenient to group my instruments in several packages, and for this purpose I make use of a number of canvas containers of

different sizes with a list of the instruments that go in each package printed on the inside, so that, in gathering together what is needed for any particular procedure, there is little chance of leaving out anything that may be required. The arrangement is distinctively neat and orderly. The craniotomy instruments, for example, are put in one package, the forceps in another, the suturing material in another, and so on. Half a dozen such packages may be put in a medium-sized leather satchel.

The following lists include all the instruments that will be needed in any obstetric operation:

- 1 obstetric forceps.
- 1 Naegele perforator.
- 1 Gessner or Zweifel cranioclast.
- 1 Mesnard-Stein bone forceps.
- 1 Braun decapitation hook.
- 1 Siebold decapitation shears.
- 1 Smellie blunt hook.
- 1 Bunge sling-carrier and sling.
- 1 Leavitt metal dilator.
- 1 scalpel.
- 2 bullet forceps.
- 2 vulsellum forceps for cervix.
- 4 to 8 artery forceps.
- 1 needle-holder.
- 1 surgical tissue forceps.
- 2 pair scissors, small and large.
- 1 abortion forceps.
- 1 abortion curette.
- 1 vaginal speculum with large plates.
- 2 retractors.
- 1 cylindrical speculum.
- 1 uterine dressing forceps.
- 1 puncturing metal catheter.
- 1 metal urethral catheter.
- 1 gum catheter.
- 1 metal bougie for artificial induction of labor.
- 1 box surgical needles.
- 2 hydrostatic dilators, one large and one small.
- 1 colpeurynter.
- 1 100-gram metal syringe.
- 1 yard of red gas tubing.
- 1 infusion outfit.
- 1 hypodermic syringe.
- 1 graduated irrigator with tubing and glass points.



- 1 nail file.
- 1 nail clipper.
- 2 hand brushes.
- 1 yard sterile iodoform gauze in glass jar.
- 2 jars antiseptic gauze, several yards each.
- 1 Breisky pelvimeter.
- 2 tracheal catheters or other device for aspirating the larynx.
- 1 stethoscope.
- 1 thermometer.
- 1 steel tape.
- 1 chloroform outfit.
- 1 bottle of lysol.
- 1 bottle of alcohol.
- 1 tube of corrosive sublimate tablets.
- 1 bottle of ergotin.
- 1 bottle of camphorated oil.
- 6 ampules of pituitary extract ( $\frac{1}{2}$  c.c.).
- 6 ampules of hypodermic preparation of veratrum.
- 1 tube hyoscine-morphine tablets ( $\frac{1}{500}$  gr. hyos. and  $\frac{1}{4}$  gr. morph.).
- sterilized catgut.
- silkworm gut.
- 3 pairs of rubber gloves, dry-sterilized and wrapped in gauze.
- 1 operating suit (coat, trousers, and gown).
- 1 rubber apron.

To this list may be added:

- \* extraction forceps.
- \* needles.
- \* Sisson hook.
- \* Kocher's needle.
- \* wire gown and headtie.

#### **The Preparation and Care of Instruments.**—All instruments

are to be disinfected by the following measures immediately before using. The instruments should be kept in water or preserves their nickel-plating. The only method of disinfection other than the preparation of instruments with chemicals, and otherwise, one will need to immerse them in a solution of carbolic acid. There is a suitable bake-pan in which to boil the instruments. The wash boiler, perhaps, has been pressed into service, and, indeed, it answers the purpose well.

The gowns, coats, and other articles to be disinfected are separately wrapped in one or more towels, tied with a stout cord, and dropped into the boiler. The cord should be long enough

to hang outside, so that, later, the packages may be drawn out and deposited in a bowl of cold 1 per cent lysol solution without danger of scalding the hands. This may be done by anyone who happens to be present, but the opening of the package and the further handling of the towel and instruments must, of course, be done only by the operator or other properly disinfected persons.

All water that is used for cooling solutions or instruments must be sterile. Some hours before it will be needed, one or more granite-iron pitchers are filled with clean water, covered with a clean towel, and boiled in the wash-boiler for twenty minutes. The pitchers are then taken out, and set aside to cool. Their further handling should be supervised by the physician or his trusted nurse.

Immediately after the operation is finished, the instruments should be cleaned and dried; and, before arranging them in the satchel or putting them in the cabinet, they should again be boiled and wiped thoroughly. Such care is worth while; otherwise, instruments become tarnished and rusty.

**Suture Material.**—Silk and catgut are the materials most commonly employed for suturing. Silk may be sterilized either by steaming or boiling at the time of operation, but catgut can not thus be treated, and must be prepared in other ways. Of the two, silk is the more reliable. Silkworm-gut, for the main, is the suture material best calculated to hold the deeper lesions in juxtaposition, but, of necessity, has to be taken out afterward. Catgut is reliably prepared in various sizes and lengths, and preserved in sealed glass tubes. To prevent its too rapid disintegration, it is first hardened with chromic acid or formaline. But there is always some danger of catgut giving way, so that, if one would be sure of holding together a ruptured perineum, it is well to introduce at least one deep suture of silkworm.

**Dressings.**—For dressings one should be supplied with sterile gauze put up in aseptic form and in suitable quantities for immediate use, gauze sponges, gauze strips for packing the uterine cavity, larger pieces for tamponing the vagina, etc. Securely wrapped and pinned, as they come from the autoclave, they may be carried in the satchel without fear of contamination. Some surgeons prefer iodoform gauze, and, for certain purposes, it may have advantages; but, on account of its distinctive and

### PURSES

not used. The effect of  
a rather and less offensive  
check the incisions with iodized  
strip of gauze just  
are of value.

### CHLOROFORM

Chloroform narcosis in childbirth is  
but can be kept sufficiently  
for the noncutting operations if  
used. There are other reasons  
for its use. After its conclusion  
the patient returns to consciousness: it is fol-  
lowed by a period of rest, and it is assimilated and  
the patient feels better. Several drops dashed upon the  
patient's nose at the onset of each pain, will be suf-  
ficient to keep the patient in this state. This way of giving  
chloroform throughout the second stage of  
labor is not dangerous, but quite as much to check  
the abdominal muscles, which  
is necessary. A little less speed permits  
the patient to thereby preserves the integrity  
of the perineum, which might be severely lacerated.  
Chloroform is necessary when performing  
the relaxation of the patient, for,  
during such procedures. To under-  
stand the patient while the patient is only par-  
tially under the influence of the anesthetic. One had better give none at  
all to destroy the patient's self-control.  
Under such circumstances that one  
should undertake to do both,--perform the  
operation, anesthetic, without proper assistance.  
If one must proceed without such help, he first  
prepares the patient, prepares whatever may be  
needed, draws on a pair of rubber gloves, and,  
lying crosswise on the bed, begins the anesthe-  
tic. When the patient is well under its influence, the chloroform

bottle and mask are turned over to the husband, or someone else pressed into service. The operator then removes his gloves, rubs his hands again with alcohol, draws on a fresh pair of gloves, and proceeds to operate. Meanwhile he watches the respiration of his patient, and otherwise supervises the anesthesia. It is difficult, even risky, to undertake such procedures alone. But in the practice of obstetrics, more than in any other field, one is confronted with emergencies that must be dealt with at once and without competent help.

**Ether in Labor.**—Ether in labor is recommended when narcosis is prolonged, or the heart is affected. It is also safer to administer than chloroform in conditions of severe anemia.

**Twilight Sleep.**—The narcosis produced by a combination of scopolamine and morphine is deserving of passing consideration. Given hypodermically, it produces a peculiar aberration of mind that appeals to some women very strongly. For many years this method of securing painless childbirth has been practiced in Freiburg, but not until recently was public attention called to it in this country. Through several of the popular magazines millions have read of "twilight sleep," until now there have developed organizations of lay women who demand it, willy-nilly. The usual dose is in the proportion of  $\frac{1}{8}$  to  $\frac{1}{4}$  gr. of morphine to  $\frac{1}{200}$  to  $\frac{1}{100}$  gr. of scopolamine (hyoscine), the latter drug alone to be repeated at intervals of from one to three hours. As a result of this publicity, obstetricians have been experimenting with various drugs, hoping to find some better means of assuaging the suffering of childbirth than they already possess. Until some standardization has been obtained, it is thought wise at this time to postpone a more lengthy discussion of the subject. Generally speaking, the author is of the opinion that art still has a long way to go before it can catch up with nature; and, after all, do not all the processes of life have within themselves the needful compensation of action and reaction?

**Spinal Anesthesia.**—Spinal anesthesia has a very limited use in obstetrics. Painlessness can be induced by it, but the reflexes are not always abolished. It has been recommended in repairing the more severe lacerations accompanying delivery. The technic is as follows: The skin area surrounding the point of injection is disinfected; the interspace between the spinous processes of

penetrating odor, many surgeons will not use iodine in obstetrics may be secured by other means: for example, if one choose to pack the gauze, he may do so by moistening a strip before its introduction with the tincture.

### ANESTHESIA

**Chloroform Narcosis.**—Chloroform is remarkably easy to induce; the patient, under its influence to admit of almost any operation, only a few drops per minute being required. For recommending chloroform for the patient is brought quickly to the floor by almost no bad after-effects, eliminated with great rapidity. The inner surface of the mask, at the beginning or just before the operation, is sufficient to keep her in a state of chloroform may be continued in labor, not altogether to the contractions, especially sometimes are undesirable relaxation of the soft parts of the parts which are to be operated on.

Deep anesthesia, for operations that need obviously, she must take an important part in the anesthesia. So important is it that one ought never to operate without it. If it so be that disinfectants are needed in connection with the anesthesia. As

springing from the vagina, the general is not a sufficient cause of the anesthesia of women. One may often be aided with a few maneuvers. The expected half a century should be remembered.

ought never to be done. It will happen that the obstetrician will be dealt with at times that judgment is required in operations that can be done; but, if we do not plan carefully enough our intrepidity.

## CHAPTER II

### INDICATIONS AND CONDITIONS

Normal childbirth is a physiologic process. This fact should always be borne in mind by the physician. The process, however, is so often complicated that the transition from a normal to a pathologic state is not easily discerned. Conditions arise in the space of a moment which may throw both mother and child into great danger. With this possibility in view, it rests with the obstetrician ever to be ready with skill and experience to manage successfully any abnormal condition that may threaten the life of his patient. It depends on him to command, to regulate, to advise, to encourage, and, eventually, perhaps, to operate, that danger may be averted.

In considering what must be done in the presence of danger, one should never forget that two lives are to be safeguarded, and that ideal obstetrics contemplates the saving of both mother and child. If, as sometimes happens, the safety of one or the other must be risked, the mother's life, generally speaking, is counted to be more precious than that of the child. After reflecting on the situation before him, the conscientious physician should ask himself fairly and squarely two questions: Am I jeopardizing a life if I do the thing that suggests itself? And am I qualified to do this particular piece of work? So, in the study of indications and preliminary conditions, the obstetrician should know the signs of danger, and should recognize them quickly; he should be prepared to act promptly; and, above all, he must be master of the situation.

### DANGERS TO THE MOTHER

Women in pregnancy are not exempt from intercurrent affections. In themselves, such diseases may become dangerous, but they are not necessarily made so by the process of child-bearing; nor, on the other hand, is pregnancy and labor always seriously

recall the possibility of an overlying flatulent intestine, and not mistake it for the percussion phenomenon of tympanites uteri.

In all conditions of infection it is well to let labor take its own course, for it has been observed that, in terminating the birth speedily, infectious material is set free from the uterus, and more readily finds its way into the circulation. Such infections are not always disastrous, by any means. We know that in many instances intrapartum troubles of this sort are unaccompanied by harm to either mother or child. Yet one is not always in a position to know whether he is dealing with a mild or a severe infection, and, before undertaking to end the birth by operative procedure, he should give due consideration to every appearance of sepsis; and he should realize that energetic interference, especially during the earlier stages of labor, is likely to be accompanied by lesions which offer inviting surfaces for inoculation. Consequently, one ought to refrain from such activity until after the cervix has been fully dilated, when the indicated operation may be carried out with relative safety. Version, for obvious reasons, is one of the procedures that should be avoided, since by entering the uterus with the hand a general smearing of its cavity with pyogenic germs is sure to occur. If immediate delivery be indicated, it is safer to take the child as it lies, either by forceps, extraction by the breech, or, possibly, by perforation and cranioclasia.

**Eclampsia.**—While the etiology of eclampsia is somewhat obscure, it is sufficiently clear to warrant certain conclusions concerning it. A series of hypotheses have been developed which go to prove that certain products coming from the embryo find lodgment in the maternal organism. These products, whatever they may be, are not counteracted or eliminated by the mother's tissues, and their augmentation reaches a point of toxicity which may burst forth in the form of convulsions. That the embryo is the source of such poisoning, is founded on the observation that the condition is at once relieved if the embryo perish or is removed from the mother. The manner of treating eclampsia, as carried out in different clinics, also tends to confirm this hypothesis. A compilation of statistics from all parts of the country shows a mortality of about 25 per cent. Comparing the

The clinics of Germany with their clinics abroad have the advantage that the rate is considerable. The advantage obtained at the Koenigsberg clinic is evident in the one to two per cent believed to be due to eclampsia is treated by the Koenigsberg clinic (page 398.) The woman in labor suffers from poor nutrition, but, through the weakness of the abdominal muscles, and the body, she becomes fatigued and unable to stand these tests of endurance the doctor finds her, such as the uncertainty of the onset of complications, the excitement of the woman in labor, and the dread of painful examinations, and there the woman in labor should be overcome. Nor is there any individual who first succumbs to exhaustion, but there resides in the weak organism an element more enduring than mere bodily strength.

It is, by any means, to determine the degree of exhaustion. When the apparent lack of progress, the impatience manifested by the patient that birth should move so slowly, the air of despair because the doctor does not "do something," all tend to intensify the element of fatigue, and engender the wish for the speedy termination of labor. And right here is one of the most dangerous pitfalls in the practice of obstetrics. Pleadingly urged by the patient, and encouraged by the relatives to interpose, one is sometimes overpersuaded, and does the thing he ought not to do—interfere. Even the most conservative of practitioners will recall instances in his experience when operative measures were attended by ill effects because of their untimely application. That such mistakes may be avoided, one should study closely objective rather than subjective signs of exhaustion. Nor should one overlook the psychic influence in combating fatigue. By advising, encouraging, and, perhaps, by commanding, the suffering woman's fortitude will be strengthened,



and labor again will resume its natural course. It often works well to give an anodyne like morphine, alone or in combination with atropine or hyosine. A few hours of sleep and rest gained by it act as a restorative. Afterward she will go on with her labor with renewed energy.

All such measures may occasionally prove of no avail, and yet one is hardly justified in resorting to operative procedure unless labor is well advanced. When cervical dilatation is complete, birth may be concluded without occasioning much, if any, harm by the application of forceps, or an extraction by the breech.

There is one condition that should be mentioned which has the appearance of exhaustion, but which really is one of prostration; it is due to a severe infection. In it the failing forces manifest themselves very early and, under certain circumstances, become so serious that labor ceases before delivery is complete. Such a condition ought never to be mistaken for a simple exhaustion. In the one the temperature and pulse remain undisturbed, and the general state of the patient is quiet, in the other the temperature is high, the pulse frequent and small, the patient grows extremely restless, and the whole appearance is one of infection.

**Weakness of the Uterine and Abdominal Forces.**—In order that labor may go on satisfactorily, certain general and local conditions are essential. The entire organism must possess a certain degree of strength; the uterine walls must be sufficiently thick; the musculature peculiarly adapted to the occasion; and lodged somewhere therein must abide that mysterious something which controls the object and purpose of birth. The efficiency of abdominal pressure must also be taken into account, including the development of accessory muscles, the diaphragm, and the levator ani. Together they form an integral bow that comes into play at the height of uterine contraction. The will power of the patient can, to a certain degree, influence this pressure either to increase or decrease its force.

**Inertia.**—Weakness of the patient may exist from the very beginning of labor, when it is spoken of as primary inertia; or it may manifest itself in a later stage, when it is called secondary

inertia. The primary form is usually due to a general debility of the individual, who may be suffering from a wasting disease. Likewise a number of particularly severe labors in rapid succession may bring about the same lack of strength. There may also be local causes of weakness, especially undevelopment of the uterus, to be observed in the very young and very old primiparæ.

If the uterus becomes overdistended, as in twin pregnancy and in hydramnion, the muscle wall becomes thin, and loses much of its contractile power; or if the wall of the uterus becomes more or less replaced by a new growth, a myoma for example, its functioning power will be lessened, and, in like manner, may cause inertia. Marked overdistention of the bladder and rectum may similarly have an unfavorable action on labor.

Secondary inertia, on the other hand, makes its appearance in the later stages of labor, mostly during the expulsive period. It is due mainly to the tiring-out of the uterus, which is made worse if at some point along the birth canal an abnormal resistance has to be overcome. The most common obstructions are of the soft parts and of the pelvis, though an abnormally large head that will not engage, or a faulty presentation of the fetus may give rise to the same trouble. Insufficient action of the accessory forces may be at fault; or it may be that these forces themselves have become tired out from inopportune efforts to expel the fetus. Women in labor are anxious to be over the ordeal, and, naturally, listen to advice that offers promise of early relief. Misunderstanding the timelessness of such encouragement, they "bear down" too early only to find themselves spent when, later, the proper time comes to make use of their reserve strength. Another and quite opposite effect is sometimes observed when at the height of a contraction, dreading the intensified pains of expulsion, the patient tries to check it by "holding back." A deficient formation of the abdominal group of muscles, "paunch bellies," and walls that have been distended by many pregnancies are also quite important factors in inertia.

All these disturbances have the same effect,—they interfere

with the progress of labor and eventually stop the process. The condition is not dangerous to the mother or the child, except the sac be ruptured and labor comes to a standstill; then there is a possibility of microorganisms finding their way into the cavity and doing much harm.

**Treatment of Inertia.**—In contending with inertia, our first object should be to restore, if possible, the normal activities of labor. This is not always easy, for we possess no therapeutic measure which will promptly and certainly regulate uterine contraction. But there are a number of remedies worth trying. Heat, for instance, has a favorable action on the uterus, and, when used in the form of fomentations, has often proved effective in rekindling the extinguished energies. Occasionally, alternating the hot with cold compresses acts even better. More active still are hot vaginal douches, given at a temperature of 120 to 140 degrees, and directed to the vault of the vagina. The douches may be repeated in an hour, but the treatment is not entirely without ill effect, because of the damage such hot lotions do to the mucous membrane. The colpeurynter, or vaginal rubber balloon, introduced into the vagina and distended, is another means of evoking the pains of labor. A still more effective device is the metreurynter, or uterine bag. It is non-elastic, and its introduction into the uterus stimulates contraction, especially if a little traction be made as it lies distended in the lower segment. It should, however be employed only when specially indicated and not merely to correct simple primary inertia.

Internal remedies have met with some measure of success; and, so long as they are relatively safe, may be used. For the most part quinia has been approved. It is given in ten-grain capsules every hour for three hours. One can hardly believe that sugar or any comparable substance can have therapeutic value except as it may act through the mind; but since no harm can come from it there can be no serious objection to its use as a vehicle for psychotherapy. Ergot and the newer drug, pituitary extract, whatever may be claimed for them, should not be given in the early stages of labor. They are used to cause a tonic

contraction of the uterine muscle, which is not to be desired at this time.

If inertia is due to overdistention of the uterus, as from twins and hydramnion, the membranes should be ruptured. The organ then becomes smaller and better able to contract.

The management of inertia near the close of labor is somewhat different from the foregoing. Inasmuch as there is no immediate danger from arrested birth, interference may still safely be deferred. The simpler measures having failed to relieve the condition, more potent remedies should be tried. Ergot is a most powerful oxytocic, but its use is limited. Pituitary extract, while less violent in its action than ergot, is by no means to be given indiscriminately. At the present time it is perhaps the most frequently employed drug for accelerating parturition that was ever presented to the medical profession. Judging from the freedom with which it is given, and the apparently few instances of harm following its use, it appeals to many physicians; yet there are those who condemn it, and probably not without reason. My own experiences with it are not unfavorable, and I have resorted to it on many occasions. Indeed, I may say that when timely given its action is most gratifying.

Another way of treating fatigue is to give the patient artificial rest with morphine, hypodermically. Under ordinary circumstances this will induce several hours of sleep, and labor will begin with renewed force. Only in case an easy delivery may be accomplished with forceps, and after drugs and other remedies have failed, is its use to be encouraged. The procedure may be looked upon favorably if it may reasonably be supposed that the child will not be born spontaneously; or, if by waiting, other complications, such as fever of the mother and asphyxia of the child, are feared. All of these conditions furnish their own indications for interference.

### **DANGERS TO THE CHILD**

Of the many dangers that threaten the life of the unborn child, nearly all arise from the same cause, a disturbed circulation between the fetus and the mother. It all culminates in the fact that the amount of oxygen held and carried by the fetal blood

becomes abnormally reduced. This comes about in several ways. The reduced state of the mother's blood, for one thing, has a marked effect, in that the total quantity of available oxygen is lessened thereby. A reduction in the size of the placental area, as may occur from a portion of it becoming loose, will also help to diminish the supply of blood to the child. The same thing can happen if a section of the placenta be shut off through degenerative change or through the presence of an infarct. A long-continued labor also interferes with oxygenation through condensation of the placenta, for not only is the area reduced in size, but the caliber of the vessels, particularly those of the uterine wall, becomes smaller. The umbilical cord itself may suffer pressure, impeding or wholly interrupting the circulation between mother and child. And, lastly, placental circulation may be disturbed indirectly from severe and unequal cerebral compression. Even if the child be born with a few flickering signs of life, asphyxia, by its destructive influences, has so affected the vital centers or so injured the structure of the lungs that it can not long survive.

The following affections and abnormalities are relatively frequent and especially dangerous to the child: (1) severe anemia of the mother; (2) certain respiratory and circulatory diseases of the mother, such as pneumonia and heart affections; (3) eclampsia; (4) premature detachment of the placenta; (5) prolonged labor after the rupture of the amniotic sac, particularly in the second stage; (6) funic complications,—low position, prolapse, knots, coiling about the body of the child, etc.; (7) severe pressure on the child's head; (8) breech positions with delay in the delivery of the head; and (9) multiple birth after the first child has been delivered.

### **The Signs of Disturbed Placental Circulation**

**The Discharge of Meconium.**—The overloading of the fetal blood with carbonic acid gas has an irritating effect on the celiac plexus and splanchnic nerve, which, in turn, stimulates intestinal peristalsis and a consequent discharge of meconium into the amniotic fluid. The liquor amnii becomes turbid from the admixture, taking on a greenish-yellow appearance. Such evacuations into

the amniotic cavity can not be discovered unless, upon examination with the hand or the introduction of a forceps blade, the occluding head be dislodged and the fluid allowed to escape. Meconium can be expressed from the child as it passes through the soft parts of the parturient canal, often observed in breech births, which makes it probable that intraamnion evacuations may occur from causes other than asphyxia. At any rate, the discharge of meconium is not in itself an indication for interference; it is simply a warning that all is not right. The fetal heart should be closely watched, and labor terminated if asphyxia becomes apparent.

**Variations in the Fetal Heart Sounds.**—An important symptom of a disturbed circulation is the variation from normal of the fetal heart. The increased carbonic acid gas causes an irritation of the vagus nerve and thereby an increased activity of the heart. The average number of pulsations in the fetus are about 140 to the minute, but it may vary within physiologic limits between 120 and 160. When the uterus contracts, its own vessels, as well as those of the placenta, become considerably decreased in size, so that for a short time the amount of oxygen to reach the child is lessened. The effect is to reduce the frequency of the heart-beat. But as soon as the pain has passed, the normal rhythm is again restored; and only when in the interim it fails to do so should this be looked upon as a sign of asphyxia.

**Premature Respiratory Effort.**—A child suffering from asphyxia, before it dies from lack of oxygen, attempts to breathe while yet unborn. In its struggles for breath, not only the respiratory muscles proper, but the musculature of the entire body participates in the convulsive effort. As a result of such strenuous inspiratory activity the bronchi become filled with fluid, the blood vessels of the thoracic cavity become congested, and even hemorrhage and punctiform extravasations of blood appear in the pleura and pericardium. The effort to breathe may be strong enough to shake the abdominal and uterine walls of the mother; and in breech-births, after the buttocks have been born, these convulsive movements of the child can be seen, as well as felt. It follows, then, that when an unborn child is struggling for breath, something must be done, and done quickly, or it will perish.

### **Preliminary Conditions**

Every operation whose aim is to facilitate delivery presupposes as one of the preliminary conditions a sufficient opening of the mother's soft parts, especially of the os uteri, for the child to pass through. Only when these parts are dilated or dilatable, can the object be accomplished without severe injury. Hence, it is absolutely essential, before attempting to empty the uterus, that an exact determination as to this condition be made by examination.

In making such an examination it is quite as important to find out the state of the internal as well as of the external os, for both must be dilated before birth can take place. It is usual in first births for the internal os, together with the cervix, to disappear by the end of pregnancy. By almost imperceptible degrees this portion of the uterus becomes effaced, so that when labor actually begins only the external os remains to be dilated. In subsequent pregnancies the condition is somewhat different, the inner os, for the most part, remaining as open as the external; but on the other hand, it may be narrower and more contracted. To make sure of the condition it is necessary to introduce a part or even the whole of the hand into the uterine cavity. Such an examination is rather painful, and may require an anesthetic.

Dilatation of the cervix is said to be complete when it is open enough to allow the head of the fetus to pass through it. The margin of the os can not then be felt upon examination; it will have been drawn back over the head. If the presenting part remains above the inlet, as, for example, in cross-births, the cervix does not entirely disappear, though it may be dilated sufficiently to allow the child to pass. A technical point in determining whether the process of obliteration is complete or not is to see if the pelvic wall can be reached with the fingers while applied against the margin of the external os. If this can be done without occasioning too much pain, continue the examination by introducing the fingers into the cervix, and note the distance between the external and internal parts of the canal. In like manner this portion also may be pressed against the bony pelvis if dilatation is sufficient.

## CHAPTER III

### THE ARTIFICIAL INTERRUPTION OF PREGNANCY

The artificial interruption of pregnancy before the twenty-eighth week is spoken of as an induced abortion. After this time, when the fetus has reached a viable state, the interruption is referred to as an induced premature birth.

To interrupt pregnancy before the twenty-eighth week means the destruction of a human life, and should not be undertaken lightly. Furthermore, it is a punishable offense, except it be done to safeguard the mother's life. Nor should the physician assume the responsibility alone of performing an abortion. For his own protection it is wise to confer with some one else, some one whose reputation and qualifications as an obstetrician are above reproach. Even when making an examination, especially intrauterine, the possibility of the patient being pregnant must always be borne in mind.

The indications for voluntarily interrupting gestation may be described under two general heads: 1. those conditions due to pregnancy itself; and 2. conditions due to concurrent affections.

### CONDITIONS DUE TO PREGNANCY

**Hyperemesis Gravidarum.**—Vomiting in the early months is so constant that it is looked upon as one of the reliable signs of pregnancy. Commonly it occurs without occasioning much indisposition, so that no special consideration need be given to it here. The cause is said to be due to the irritation brought about by the change taking place in the uterus, acting on the stomach reflexly through the vagus nerve. The affliction is most likely to trouble one of a nervous temperament, becoming clearly a hysteroneurosis, and should be treated as such. Rest in bed, a modified diet, and the administration of bromides, generally relieve the symptoms, and enable the patient to recover. The more



obstinate cases of hyperemesis gravidarum ought to be under hospital supervision, where care and treatment can be more exactly carried out. Simple change of surroundings supported by suggestive therapeutics, is sometimes sufficient to effect immediate cure.

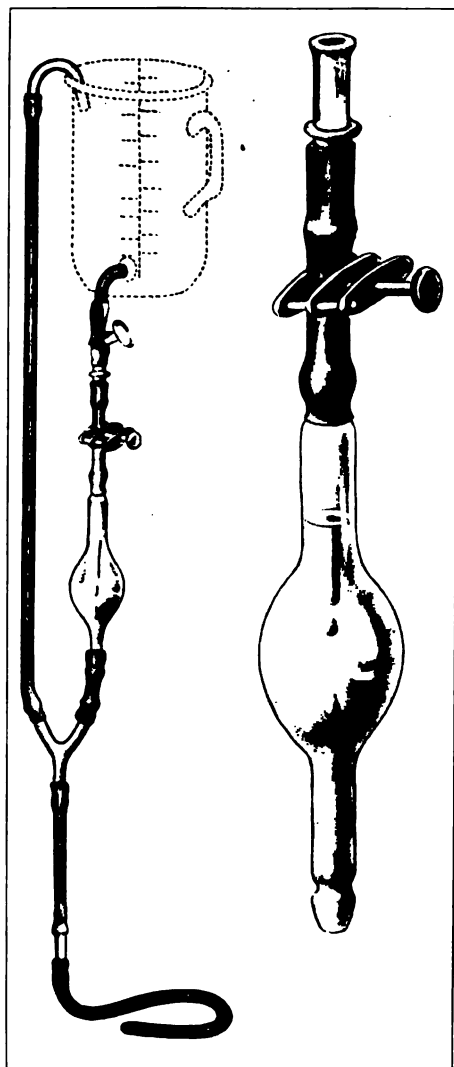


Fig. 8.—Murphy proctoclysis apparatus.

W. B. L. B. L.

Treatment, first of all, should aim to restore nutritive balance; and it is especially important to supply water to the system. This is accomplished by means of rectal enemata. An excellent device for the introduction of fluid into the bowel is the Murphy proctoclysis apparatus (Fig. 8). With it water can be introduced drop by drop, as much as a liter being absorbed in the course of an hour. The success of this method is often gratifying. A case in illustration is cited:

A woman, twenty-five years of age, began vomiting in the second month of her second pregnancy, at first in the morning, then after each meal, and continued to vomit until she became so weak that she had to remain in bed. Medical treatment failed to give relief. At the sixth month it was thought necessary to induce abortion, and with this in mind she was taken to the hospital. There, instead of emptying the uterus, she was kept in bed, given rectal alimentation, hypodermoclysis, and proctoclysis. She improved under this treatment; the vomiting ceased, and the weight increased. At the end of a month she could be up and take food by the mouth.

Unfortunately, not all cases of hyperemesis respond thus readily to treatment. Instead, the temperature becomes elevated, the pulse weak and rapid, albumin appears in the urine, the urine itself is decreased in quantity, and, in spite of hypodermoclysis and proctoclysis, the affection shows no abatement, and even gets worse. Such a state is undoubtedly one of toxemia, a condition fatal to the patient unless something more radical be done. The liver and kidneys, the organs most vitally concerned in the process of elimination, have already been taxed beyond their physiologic limits; severe and long-lasting emesis has interfered with nutritive assimilation; and the fluids have been abstracted from the body—all of which leads to an accumulation of toxic substances in the blood, which helps to intensify the disease, and which ultimately will end in the woman's death if the offending object, the ovum, be not destroyed. Neither is it wise to temporize too long, for sometimes the patient's vitality gets so low that, even after the uterus has been emptied, it is impossible for her to rally from the toxemia.

**The Hydatidiform Mole.**—Cystic degeneration of the chorion, also known as hydatidiform mole, progresses rapidly and seriously upon the blasting of the fertilized ovum. Unconscious at

first of anything unusual, the pregnant woman's attention later is called to a peculiar bloody discharge. Coincident thereto a destructive process is going on in the uterine wall which may become rapidly fatal; and, because of its serious nature, such a growth must be removed from the cavity of the uterus as soon as the diagnosis is made. (Figs. 9 and 10.)



Fig. 9.—Hydatidiform mole filling the uterine cavity. (Kerr.)

The determining characteristics of a mole are its rapid development and the presence of villous cysts constantly appearing in the discharges. The uterus itself is more nearly spherical in form and more elastic in feeling than in normal pregnancy. The organ is also much larger than would be expected in a gestation corresponding to the time of pregnancy claimed by the patient. No fetal parts can be felt; and no fetal movements or fetal heart



Fig. 10.—Hydatidiform mole. (Kerr.)

sounds are to be made out. There is general anemia and weakness.

The following case came under my care at the University Hospital:

Mrs. W., thirty-three years of age, a decipara, Austrian. Always well and strong, with the exception of an occasional disturbance of the stomach. Previous pregnancies normal.

March 1. Patient began to have severe pain in lower abdomen, and to flow profusely. Thought she was pregnant because the womb was enlarging. Flow continued, and on March 27 she came to the hospital with a diagnosis of incomplete abortion at two and one-half months.

Very weak and pale. The fundus of the uterus extended to the umbilicus; mass, boggy and irregular; no fetal parts made out.

On March 29, patient suffered a sudden gush of fluid, mostly water, but tinged with blood. A clinical diagnosis of hydatidiform mole was made.

On April 1, five days after admission, the cervix was dilated with a Leavitt dilator, and the uterine contents carefully removed with a large dull curette. Quantities of cysts were brought away.

For several days there followed a bloody discharge, which later became offensive and purulent.

Examined the eleventh day, the fundus could be felt above the pubes, firm but tender to the touch. That night the patient complained of pain in the region of the bladder, and on the day following she began to flow, clots and bright blood, which continued with intermissions for several days.

April 3. The uterus found above the symphysis; rather boggy; sensitive. In size, the mass was about as large as the fist. Seen in consultation with another member of the staff, she was transferred from the obstetric to the surgical ward of the hospital.

April 26. Operation. Uterus enlarged; ovaries and tubes matted together. Uterus, tubes, and ovaries removed; also a small growth excised from the upper margin of the vaginal orifice.

Pathologic findings: Uterus 8 cm. in length; walls 2 to 3 cm. thick. No ulcerations apparent. Tubes 8 cm. long, and normal. Ovaries large and cystic.

Microscopic examination of the cysts, removed soon after admission to the hospital, showed large villi covered with chorionic epithelium, and containing a few spindle-shaped cells with interstitial substance resembling mucin. Sections of the uterus showed groups of syncytial masses, much more numerous in some sections than in others. Slight necrosis around some of the large superficial groups. The tissues excised from the vaginal orifice proved to be benign, though several small syncytial masses similar to the ones in the uterus were found in portions of the upper wall.

Diagnosis: (1) hydatidiform mole; (2) syncytial mass suggestive of malignancy; (3) metastasis in vaginal wall.

Subsequent condition: Seen six months after the operation, no indications of malignancy were to be found.

**Acute Hydramnion.**—There are two conditions which may be the cause of acute hydramnion,—fetal malformation and multiple gestation. Either of these may occasion a great increase in the amount of amniotic fluid, so much so that even in the early months the abdomen will have the appearance of a full-time pregnancy. Such rapid distention is accompanied by pain and dyspnea and may, under certain circumstances, have associated with it a cardiac insufficiency.

Treatment calls for the interruption of pregnancy, to which one agrees readily, since at best in this disease the child is lost.

**Retention of a Dead Ovum.**—Sometimes the fruit of conception dies, but does not at once come away. In rare instances the dead embryo remains for weeks within the uterus without noticeably influencing the maternal organism, but, should there be evidence of fetal death, the uterus ought to be emptied.

**Habitual Death of the Child.**—Now and again it happens, and without explanation, that the child dies short of term. Frequently, as is well known, its death can be accounted for through lues; but in a surprisingly large number of cases the etiology remains unknown. Now, if one be astute enough to anticipate this unfortunate behavior by inducing labor while the child is still viable, he perhaps may prevent its death; but no one lays claim to such powers of discernment. One can only act on the theory that, inasmuch as death under similar circumstances had occurred several times before, it might be prevented by bringing on labor prematurely.

**Displacements of the Gravid Uterus.**—(a) **RETROVERSION.** (Fig. 11.) When the retroflexed uterus becomes pregnant, the rule is that it will right itself at about the third month and remain in the abdominal cavity. Occasionally, however, it does not behave thus favorably; it persists as a pelvic organ, where it continues to undergo further growth and development. Under such circumstances symptoms of pressure follow in the fourth and fifth months. The enlarging uterus shuts off the urethral canal, causing overdistention of the bladder. The rectum also suffers, but not to the same degree. If this state of things continues, gangrene of the bladder with fatal peritonitis will ultimately follow. Most women, however, will consult their physician early



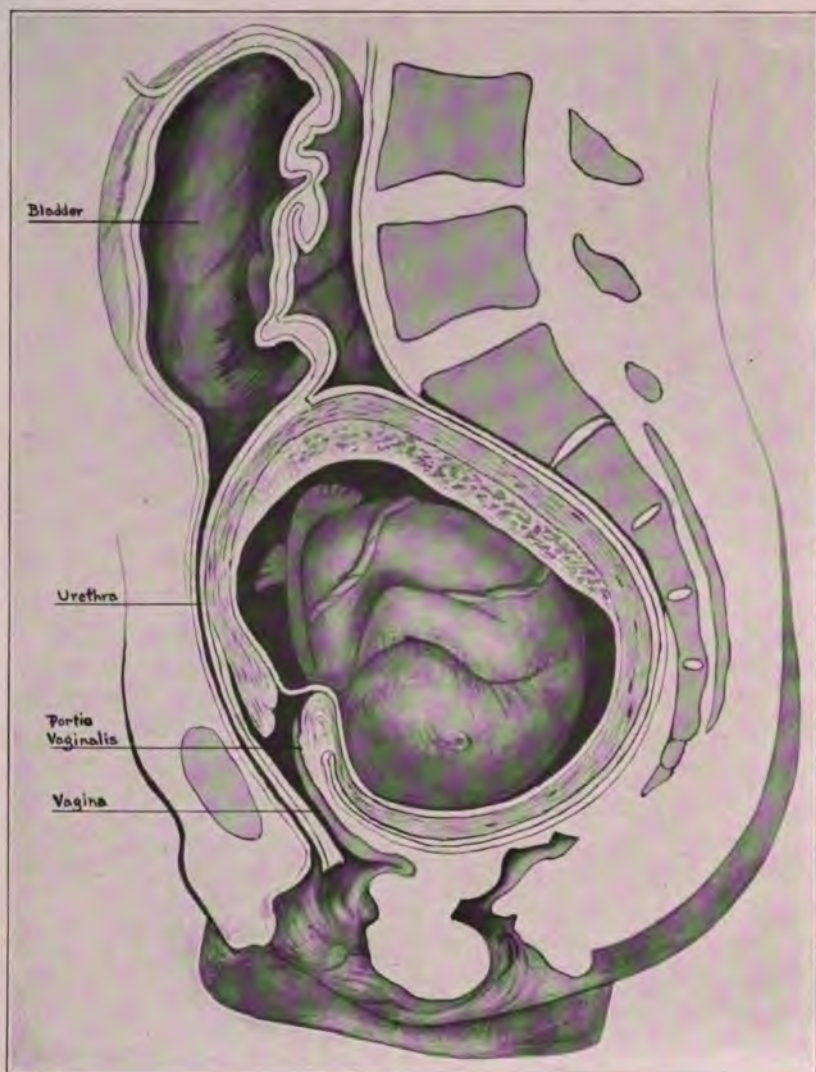


Fig. 11.—Retroverted gravid uterus. (Runge.)

enough to have the imprisoned organ released while release is still possible.

The following are the typical findings in incarceration of the gravid uterus. Above the symphysis is found a cystic tumor

extending upward to the navel,—the distended bladder. Within the vagina, which is much reduced in size, the cervix lies shelving across the anterior vault; behind, the posterior vault of the vagina and the cul-de-sac of Douglas are filled with an elastic tumor,—the body of the uterus.

The first step to be taken in attempting to reduce such a dislocation, is to empty the bladder cautiously by catheterization.



Fig. 12.—Manual reduction of the retrodisplaced gravid uterus. (Bumm.)

This procedure alone may sometimes be sufficient. Next, the patient should be anesthetized, the entire hand passed into the vagina, and if possible the body of the uterus elevated. This maneuver having failed with the patient lying on her back, she is then placed in the knee-chest position, and an effort is made to push the uterus beyond the promontory of the sacrum. (Fig. 12.) The colpeurynter, placed in the vagina and gradually



distended with water, is an excellent expedient in lieu of the hand. Such maneuvers may be continued for a considerable length of time, care being taken frequently to empty the bladder.

There are two conditions which may arise to make reposition impossible: First, the body of the uterus may be immobilized by inflammatory adhesions; and, second, the pelvic inlet may be so contracted that the enlarged uterus can not be forced through it into the false pelvis above. In the former situation the uterus may be freed through abdominal operative procedure; but, most likely, this would interrupt pregnancy, and would, of course, fail if the inlet were contracted.

(b) **PROLAPSE OF THE UTERUS.**—Women with persistent total prolapse of the uterus seldom become pregnant. When conception takes place under this condition, the uterus draws itself back into the pelvis as enlargement goes on. Unless it becomes reduced in this way, spontaneous abortion must result. So, whenever it is found impossible manually to replace the gravid uterus, pregnancy should be interrupted.

**Spatial Inadequacy.**—In cases which present a disproportion between the head of the child and the pelvis of the mother, especially if such inadequacy has been observed in a former pregnancy, it is well to consider the advantages of premature labor; for with a smaller and more plastic head there are fewer mechanical difficulties to overcome than at full term. Troublesome disproportions seldom occur in the woman of normal development; but in such as have a contracted pelvis, premature induction of labor is one of the procedures to be thought of. The various methods of inducing labor will be dealt with later.

In passing it may be remarked that when a woman with a contracted pelvis comes under observation, one is often puzzled as to how to proceed,—to apply forceps, induce labor at the eighth month, perform version, separate the pubes, or do an abdominal section. The specific advantages of each procedure will be discussed under its appropriate head. Our object is to get the child past the obstruction; and, obviously, the smaller the object the easier it will pass. For this reason labor, if induced at all, should be induced at the earliest possible time consistent with safety to the child.

Theoretically, a child is viable after the twenty-eighth week. Instances of its surviving when born at this age are on record; but, practically, one can not reckon on a child living that is under thirty-four weeks. Even this early its head will be too large to pass through the pelvis if the true conjugate is less than 8 cm. in diameter. On the other hand, the longer a child remains in the uterus, and the more developed it becomes, the larger and harder its head grows to be. So that, in considering the advisability of inducing labor prematurely, three things should be borne in mind: (1) the stage of pregnancy; (2) the degree of pelvic contraction; and (3) the size of the child's head.

The duration of pregnancy is generally reckoned from the beginning of the last menstrual period; but, under certain circumstances, it may be calculated more exactly. It may also be estimated by making measurements of the child *in utero*, noting its movements, listening to its heart, and palpating its body. In not overthick abdominal walls it is possible to measure the fetus with the pelvimeter. The head is sometimes so easily palpated that its size can be determined after the method of Mueller, that is, by forcing the head into the superior strait by means of pressure made with the hands from above. The examination should determine whether the fetus is alive and, also whether there is more than one child.

In first pregnancies induction of premature birth is to be thought of only in exceptional cases, for the reason that a test of labor has never been made. Owing to the small size and moldability of a child's head, a great number of deliveries in contracted pelves are spontaneous; and experience has taught us that in most instances nature is surprisingly competent. We shall have to admit that as yet we have not acquired that exact knowledge which enables us to say just when is the proper time to induce labor.

Having considered the basic principles underlying the procedure of inducing labor prematurely, it is well to review the results, and take a look at statistics. In 2,200 reported cases, two mothers and fifty-six babies in every one hundred and fifty deliveries died (1.3 per cent mortality for the mother and 37 per cent for the child). This is not a very good showing for the

child, not nearly so good as in cesarean section or pubiotomy; but for the mother the mortality is lower than in either of these operations. For her the procedure is practically harmless. Of 938 women with contracted pelves who went their full time, only 34.5 per cent of the children lived, while the same women, prematurely delivered, gave birth to 71.9 per cent of living children,—a fetal mortality of 65.5 per cent and 28.1 per cent, respectively.

The induction of premature birth, therefore, may, in conditions of pelvic inadequacy, be considered a prophylactic operation. The excellent results obtained warrant its undertaking. The following clinical history illustrates its advantage in the case of a woman who experienced four pregnancies:

Pelvic measurements: interspinous, 23.4 cm.; intercrural, 26.5 cm.; external conjugate, 18.8 cm.; diagonal conjugate, 10.3 cm.; true conjugate, 8.5 cm., a generally contracted flat pelvis.

The first pregnancy went to term. The child's head had to be perforated. The second terminated in a spontaneous abortion.

Version was performed in the third. The child died during the delivery of the after-coming head.

At the 37th week of the fourth pregnancy, labor was prematurely brought on. The child lived; weight, 2890 grams.

### CONDITIONS DUE TO CONCURRENT AFFECTIONS

**Organic Heart Disease.**—A diseased heart will, through degenerative changes, be greatly influenced by pregnancy and labor. The increased vascularization causes it to become burdened with extra work. It also comes about, especially in the later months of pregnancy, that the growth of the uterus increases the intra-abdominal pressure, and thereby tends to impede the reflux of blood from the lower half of the body, which in the tortuous and distended veins can be overcome only by greater efforts on the part of the heart. A further injurious effect lies in the waste products of the embryo being taken up by the maternal circulation, the so-called toxins of pregnancy; and, depending on their quantity and toxicity, they acquire an influence on the heart. And, finally, pregnancy has a marked psychic effect on the

heart, particularly when accompanied by an apprehensive state of mind.

At the time of labor still greater demands are put on the activity of the heart. During each pain, especially in the expulsive stage, the pressure in the vascular system is acutely and sometimes dangerously increased: the frequency of the pulse begins to rise at the onset of a contraction, and subsides slowly with the passing of the pain. At the moment the child is born, a significant fluctuation takes place in the vascular pressure. The intraabdominal pressure sinks, and coincidently a strong influx of blood occurs in the vessels of the belly cavity.

During the puerperium all these phenomena slowly return to normal, but the influence on the cardia lasts for some time because of the arterial tension. After delivery, large vascular areas are formed in the circulation, which, together with the absorption of fat and other products of involution, have the effect of continuing the circulatory disturbances still longer.

How does nature take care of these changes? Not only the sound organ withstands the increasing demands, but even a heart with valvular insufficiency is not affected, or, at least, very little, if compensation remains undisturbed. A surprisingly large number of women with heart disease go through childbirth without presenting any ill symptoms whatsoever. But heart disease may have an altogether different meaning if compensatory disturbances manifest themselves. On the one hand, the insufficiency may be incidental with the pregnancy itself; on the other it may be due to the contingent demands made on the heart at the time. Under such circumstances the lesion can become serious enough to cause death, even during pregnancy, unless therapeutic measures are promptly applied. Let me cite a case in illustration:

At the age of seven, a girl suffered an attack of scarlet fever and diphtheria with an accompanying nephritis. She never fully recovered, complaining in particular of palpitation of the heart and shortness of breath. Under medical treatment she got so she could do light work, and had no compensatory disturbance of the heart. At twenty-three she became pregnant. Early in the first month her difficulties began to increase, especially the palpitation and edema, so that she was forced to remain in bed most of the time. From the

fifth month on the dyspnea became increasingly worse, growing so severe that she was obliged to go to the hospital.

Upon admission, the findings were as follows: fetus of medium size; edema of both legs extending to the thighs; swelling of the abdominal skin and face; marked cyanosis. Cold extremities; anxious countenance; orthopnea. Temperature slightly subnormal. The apex beat was at about the sixth interspace, to the left of the mammillary line. A loud bruit could be heard over the sternum and apex. Heart action, regular, 100 to 108. Very small pulse; poor quality; hard to count; changeable. Attacks of suffocation. The fundus of the uterus reached a handbreadth above the umbilicus; the head and small parts were not palpable. Fetal heart sounds and fetal movement, not demonstrable.

First of all, the gravity of the compensatory disturbance was combated through stimulation. Digitalin was given hypodermically, followed by half-hourly doses of camphorated oil and hot applications over the heart. This gave little relief, though for the time being the pulse was perceptibly better. After one hour, the conditions grew rapidly worse; the sensorium, hitherto clear, became cloudy, and death ensued.

The autopsy showed chronic endocarditis; mitral, tricuspid, and aortic stenosis; hypertrophy and dilatation of the heart chambers; fatty degeneration; hydrothorax and pericardial effusion; and general anasarca.

Compensatory disturbances during pregnancy are treated as they would be at other times. In order that physical and mental excitement may be reduced as much as possible, the patient should be kept in bed, the diet carefully regulated, and proper heart tonics given. Digitalis and strophanthus are the two drugs most frequently employed. If, after following this treatment for a week or ten days, the disease is not better, pregnancy will have to be interrupted.

It frequently happens that in one pregnancy there is no disturbance of the heart, or very little, while in another pregnancy the same woman will develop such alarming symptoms that one is called upon to advise against a repetition of the risk. And, if the lesion is so serious that gestation must be interrupted in order to save the patient's life, it should be borne in mind that, even though she reach term, there is a further danger from the process of birth itself.

The following case illustrates well how differently heart disease may be affected by one pregnancy as compared with another in the same individual:

Patient thirty-eight years of age. Had an attack of chorea in childhood. In her twenty-sixth year she noticed for the first time that in performing her

household duties she became easily tired, and experienced difficulty in breathing. A physician was consulted, who found a severe heart lesion. In the twelve years following she was pregnant eight times.

**First pregnancy:** No difficulties experienced during the whole period. Labor lasted twenty-four hours, and was quite normal.

**Second pregnancy, four years later:** At about the sixth month the heart began to give trouble, and, as she grew worse, she was taken to the hospital near the end of gestation. Examination showed mitral insufficiency with severe compensatory disturbance, complicated by double hydrothorax, nephritis, anasarca, and edema of the labia. In spite of treatment, induction of premature labor became necessary. Compensation rapidly returned. Because of the severe type of the disease, the patient was strongly advised not to permit another conception—she was even urged to undergo an operation for sterilization. All admonitions were disregarded, and within a few months she again became pregnant.

**Third pregnancy:** This ran without disturbance until the fourth month, when a spontaneous abortion terminated gestation.

**Fourth pregnancy:** Gestation progressed well until the last month, when she began to suffer from palpitation and shortness of breath. She had a spontaneous labor at term and passed a normal puerperium.

**Fifth pregnancy:** Up to the fourth month without trouble; then followed palpitation and shortness of breath, also swelling of the feet. These symptoms continued to grow worse until the seventh month, when miscarriage took place.

**Sixth pregnancy:** The first five months were without interest. There was then a return of the palpitation, vertigo, and shortness of breath. In the eighth month premature birth relieved the symptoms.

**Seventh pregnancy:** There was no cardiac disturbance, but the patient aborted in the fifth month.

**Eighth pregnancy:** This time the patient went six months without complications. In the seventh she had a return of the symptoms noted in the former pregnancies. Without other involvement than that of the heart, she gave birth to a dead fetus.

The severe and complex heart symptoms arising in the second pregnancy were made worse by nephritis. In most of the other gestations, spontaneous interruption occurred before any marked damage was done the heart and before the kidneys were affected. Only twice out of eight times was a fully developed child born.

**Pulmonary and Laryngeal Tuberculosis.**—The influence of pregnancy on a patient with pulmonary tuberculosis is peculiar and varied. The disease, which till then remained latent, now makes its first appearance, or may take on increased momentum if already manifest. In any case, the concurrence of pregnancy and tuberculosis is a serious matter. Cases in which beginning

or latent tuberculosis exists without effecting any noticeable changes during gestation, later show more or less damage from the complication through which the patient has passed. This is accounted for by the fact that respiratory movement becomes limited, and in consequence the lung tissue receives less aëration, circulation is interfered with, and, eventually, nutritive disturbances become manifest. In this way tuberculosis of the lungs may make insidious headway during pregnancy. When labor comes along, the blood pressure, especially at the height of a pain, rises, and this, added to the increased demands made on the lungs, acts unfavorably on the disease.

The accepted facts concerning tuberculosis make it a positive duty to watch very closely every case of concurrent pregnancy and phthisis. As the physiologic symptoms increase, the body weight decreases, the temperature rises, the pulse is quickened, and, possibly, hemorrhage or a pleuritis may occur. In determining the diagnosis one may make use of the ophthalmic or some other reaction. A negative result is favorable, inasmuch as it proves the existence in the body of immunizing substances. A positive reaction, on the other hand, is unfavorable, and is to be considered in connection with the contemplated interference. The following is a case in mind:

A tuberculous multipara, thirty-one years of age.

About a year before the seventh conception, sticking pains began in the chest, accompanied by a profuse expectoration. These symptoms became aggravated during pregnancy and emaciation was rapid. In the third month adventitious sounds could be heard over both apices, and tubercle bacilli were found in the sputum. An abortion was performed, followed by quick recovery. Three years later another pregnancy, with fewer lung symptoms followed. A spontaneous abortion occurred in the third month. After some years more, she conceived again. This time the lung symptoms were much aggravated; profuse expectoration; fever; and pleuritis. Refusing all therapeutic measures, spontaneous abortion took place between the second and third months, after which she improved rapidly.

The indications for interference do not apply if the tuberculosis has reached such a hopeless state that only the preservation of the child is to be considered. To illustrate: A patient in the seventh month of gestation, suffering from severe lung and larynx tuberculosis, consults the obstetrician, who finds upon

examination that the disease is far advanced. Shall he advise the induction of premature labor? In the interest of the child, no; as for the woman herself, nothing will be gained. If the indications for concluding gestation assert themselves near the end of pregnancy, it may be possible to defer interference to a time when the child's chances of living are most favorable—when one has only the effect of the birth itself to consider.

As a preparatory measure, in case pregnancy should occur again, it is recommended that forced feeding be begun soon. Sterilization may properly be advised in some instances.

Tuberculosis of the larynx is a particularly severe and incurable form of the disease. Indeed, the outlook is so bad that once the diagnosis is made, pregnancy must invariably be interrupted.

**Nephritis.**—As excretory organs the kidneys hold a high place, especially during pregnancy. It is largely through them that must take place the elimination of waste products which find their way into the blood, elements which carry with them irritation and injury to the kidneys. These irritating substances show their effect by causing albumin to appear in the urine; the secretion is also diminished, and the lower extremities become swollen. A nephritis can exist during gestation without essential organic change, and afterward the patient become entirely well; and for this reason it is usually unnecessary to apply therapeutic measures for its relief, more than to keep in check the injurious effects by appropriate regulation of the diet. In other cases the picture becomes more serious. There may be continuous headache, vomiting, loss of appetite, malnutrition, and dropsical effusions in the serous cavities, which are symptoms that demand more active treatment. The patient should be put to bed, and allowed only a milk diet. If these measures fail to bring about an improvement, the interruption of pregnancy is demanded. With its termination all indications of nephritic insufficiency disappear.

In contrast with this aspect of the affection, it occasionally happens that the kidneys will exert, through the influences of the irritating substances which their disordered condition brings about, a damaging influence on the cerebrum, especially disturbances of vision. These may sometimes be purely functional with



no positive alteration in the eye-grounds; but in other instances, mostly of slow development, there occurs a perceptible affection of the fundus, such as albuminuric retinitis, hemorrhage, or separation of the retinal membrane. Such lesions carry with them a considerable percentage of persistent changes in the eye, even blindness. For this reason, interruption of pregnancy is indicated upon their first appearance. And, surely, one would make a grave mistake not to know of the existence of a permanent chronic nephritis in his patient. All the injuries that have been mentioned can then happen from the beginning of pregnancy, developing most alarming symptoms of uremia and terminating in death.

Furthermore, an exacerbation of a quiescent kidney lesion can follow upon the termination of pregnancy; and this is another reason why a woman with a chronic nephritis should have gestation interrupted.

An acute nephritis appearing in pregnancy seldom demands interference. Either the nephritis runs on with the pregnancy or the pregnancy ends spontaneously, as it does in many of the infectious fevers.

**Pyelitis.**—Coming on in pregnancy, pyelitis like nephritis, is seldom an indication for inducing labor. In the majority of cases the pyelitis runs its course without particularly endangering the pregnancy, provided, of course, that the inflammation is properly treated by rest in bed, with a milk diet, an ice bag over the renal region, and urotropin. Only in the rarest cases of this kind is one compelled to interfere with pregnancy, and then only when the symptoms are of such severity that one has to reckon with death.

**Chorea.**—Those who suffered from the disease in childhood are said to be more liable than others to have it during gestation. It may come on slowly and run a mild course; or it may begin acutely and become dangerous. The poisons in the severer forms of the affection excite such violent muscular activity that the patient grows exhausted; and, in complication with other closely associated diseases, such as endocarditis and erysipelas, death may follow. As many as forty-five deaths in two hundred and fifty-five cases have been reported. Inasmuch as the chorea

ends, as a rule, with the expiration of pregnancy, a severe attack may demand that gestation be interrupted.

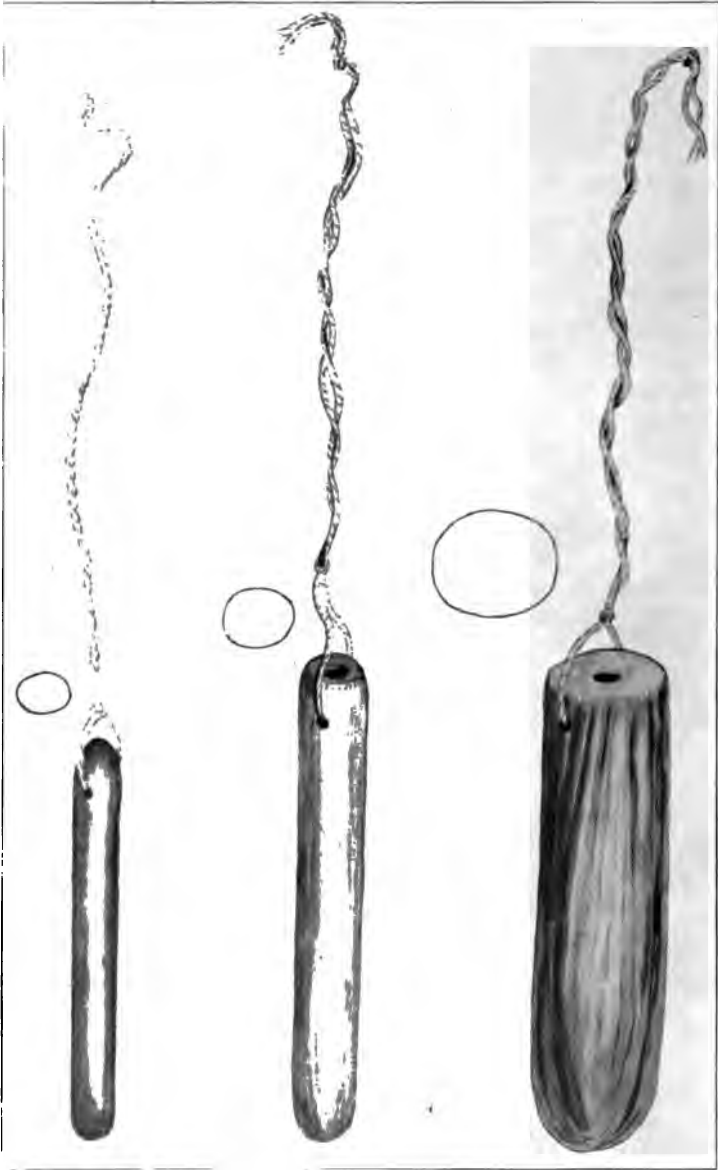
**Diabetes Mellitus.**—Diabetes in pregnancy can give rise to serious complications. Judging from the relative frequency of the disease, there seems to be a certain connection between liver function and the waste products of gestation. Under some circumstances the diabetes remains stationary. Upon a proper diet, together with a suitable physical and mental regimen, the pregnancy goes on to a favorable termination and without specially aggravating the diabetes. In other cases the concurrent disease has a tendency to grow worse. To interrupt pregnancy may save life in bad cases, if done soon enough. The operation, therefore, must not be long delayed if sugar persists and acetone appears in the urine.

**Blood Disease.**—The etiology of pernicious anemia is obscure. The symptoms are a waxlike pallor, apathy, dyspnea, hemic heart murmurs, great weakness, and insufficient nutrition. Examination of the blood shows a remarkable diminution of both red cells and hemoglobin. Megaloblasts, poikilocytes, and microcytes appear. The affection almost always has a fatal termination, which pregnancy helps to hasten. Likewise leukemia with its striking augmentation of white cells and its diminished number of red cells, together with the formation of a splenic tumor and enlarged lymph glands, will, in rare cases, constitute a complication ending in death. Hemophilia is manifested at the time of delivery, especially in the third stage, the danger being from hemorrhage.

### METHODS OF INDUCING ABORTION

The technic of artificially emptying the uterus depends for its ease of accomplishment upon the time of pregnancy, the size of the embryo determining the manner of performing the operation. Within the first four or five months it is necessary either to dilate the cervical canal and excite the uterus to expel its contents, or, after dilating, to enter the cavity and remove the ovum. There are several ways of doing this.

**The Tampon.**—The patient is placed on the bed crosswise, and, after the necessary cleansing and sterilization, the vagina is



*A* *B* *C*  
Fig. 13. Laminaria tents. *A* and *B* represent two sizes; *C* is *B* swollen from moisture.

packed with moist sterile gauze. For this purpose iodoform gauze is thought to be best, but plain gauze wrung out in hot saline will answer. The vault of the vagina can be more thoroughly packed if the patient assume the Sims' position. The effect of the tampon is to excite labor and relax the tissues, the cervix becoming dilated and the ovum cast off, sometimes after a single treatment. If, at the end of twenty-four hours, no result has



Fig. 14.—Four sizes of the Hegar metal dilators.

been obtained, the tampon is removed, the vagina again disinfected, and the process repeated. If the ovum still remains in the uterus at the end of forty-eight hours, other measures need to be employed.

**The Use of Tents.**—Following the same aseptic precautions, and with the patient close to the edge of the bed, the anterior lip of the cervix is grasped with bullet forceps, and the portio vaginalis is drawn into view. A laminaria plug is passed into the cervical

canal and left to swell from the moisture it absorbs. The device is usually four or five centimeters long, and is introduced by means



Fig. 15.—Dilating the cervical canal with the Hegar metal dilator.



Fig. 16.—Puncturing catheter.

of a sharp-pointed instrument stuck in the tent, or by any other device that will hold it securely. A loop of thread attached to

the outer end of the tent is tied to a strip of gauze packed loosely about the cervix. Within twenty-four hours the canal should admit the finger. (Fig. 13.)

**Dilatation by Means of Hegar's Metal Dilators.**—This is accomplished by passing into the cervical canal a series of graduated metallic sounds, beginning with one which will readily enter, followed by others of increasing size. The last one may be as large as the finger. (Figs. 14 and 15.)

**Rupturing the Amnion.**—Puncturing the amniotic sac as a means of inducing labor is applicable only in hydramnion. The anterior lip of the cervix is grasped with bullet forceps, and a sound is passed through the canal into the amnion. If the cervix is patulous, a trocar can be used instead of a sound. (Fig. 16.)

None of the aforementioned methods of inducing abortion is always successful. The vaginal tampon is worth temporizing with because of its safety and ease of application. Tents have fallen into disuse as unsurgical, and are seldom employed. Puncture of the amnion disturbs the growth of the ovum, but sometimes the process of casting off the arrested life is slow and uncertain. Especially is this true if the puncture be made early in pregnancy, or when the amount of fluid is small. So, this method is of doubtful value except in cases of acute hydramnion. Only if actual labor begins and continues will the uterus empty itself; otherwise, it will be necessary to complete the process instrumentally.

In deciding which method to use, one must consider the circumstances of the case, and the advisability of doing it rapidly or slowly; and, quite as important, one should consider one's own preferences and skill. But under all circumstances, no matter which method is followed, the most painstaking asepsis is to be observed, and every risk of infection avoided.

To bring about premature birth in the later months of pregnancy, the essential thing is to incite labor; and the simpler the method, so long as it proves effectual, the better.

**METHODS OF INDUCING PREMATURE BIRTH**

**The Prolonged Vaginal Douche.**—Several quarts of hot water are given every three or four hours, the stream being directed into the anterior fornix of the vagina and against the cervix.



Fig. 17.—Introducing the bougie. (Kraus's method of inducing labor.)

After repeating the treatment several times, labor may begin; but, should it not, the procedure is not without good effect, since it relaxes the tissues, lessens the pain, and shortens the stage of cervical obliteration.



Fig. 18.—  
Knapp's elastic metal  
bougie.

**Metreurynter.**—When no particular haste is demanded, the use of hydrostatic bags is a very satisfactory means of inducing premature labor. Before the bag can be passed into the uterus, however, the cervical canal must be open enough to admit the finger, which means that some preliminary dilatation, either spontaneous or artificial, must be effected. When this degree of dilatation has taken place, the rubber balloon is rolled into compact form and introduced within the uterine cavity. There are special forceps made for holding the metreurynter but the ordinary gynecologic dressing forceps answers the purpose well. The anterior lip of the cervix is secured with a vulsellum forceps, and the balloon cautiously pushed through the canal, directing it backward between the amnion and the uterine wall. The bag is then distended with water, and traction is made on the connecting tube, either with the hand or by means of a light weight allowed to hang over the side of the bed. When labor is well started, the bag should be removed, especially if a living child is expected, for it must ever be borne in mind that premature infants bear obstetric procedures badly. A spontaneous birth is greatly to their advantage. After labor has surely begun, it may be left to progress naturally.

**The Bougie.**—The manner of introducing the bougie is not unlike that of introducing the metreurynter. The patient is brought to the edge of the bed, the vagina opened with the speculum, the cervix exposed to view, and the bougie passed into the uterus. (Fig. 17.)

There are several varieties of bougies recommended, the most common of which, and the most readily obtained, is one made of linen, flexible and smooth. No. 18 is the size generally used. After its proper sterilization, the instrument is passed into the uterine cavity, care being taken, as with the metreurynter, not to rupture the sac. (Fig. 18.)



It is desirable to direct the bougie along the median line posteriorly, going as far upward as possible, and keeping between the membranes and the uterine walls; but, on account of its flexibility, one can not be sure of the course it pursues. If a contraction occurs during its introduction, the procedure is interrupted until the uterus again relaxes. (Fig. 19.)

Before beginning the operation, one should try to fix the site of the placenta, so that, in introducing the bougie, it may be passed to the opposite side. It may not always be possible to do this, but when it is, it is an advantage. A helpful observation when trying to make out the placental insertion is, that when the organ is situated posteriorly, the tubes and ligaments are crowded to the front; and, conversely, when it lies anteriorly, the tubes and ligaments are pushed backward, and lie in the flanks of the patient. The area in which the uterine souffle can best be heard is sometimes an aid in determining this relation.

If, in passing the bougie, a part of the placenta becomes detached, as known by the appearance of blood, the instrument should be partly withdrawn and started in a new direction. When once in place, it is held there by a vaginal tampon.

**Puncturing the Amnion.**—The patient is placed in the dorsal position, knees flexed, parts disinfected, and the vagina opened by either a Simons' or an Edebohls' speculum. With the cervix thus exposed, a slim dressing forceps, a sound, or a trochar is guided through the canal into the amniotic cavity. As much as 50 to 100 c.c. of fluid should come away. If less than this amount is removed, pregnancy may not be interrupted. The operation itself is simple, but it can prove serious to the child through the prolapse of the cord, which is favored by the untimely discharge of amniotic fluid. If the head of the child presents, the accident is not so likely to occur, since the head more readily enters the superior strait, and thereby prevents the cord from falling in front of it.

**Dilatation with the Branched Instruments.**—Dilatation may be accomplished in a much shorter time with the Leavitt dilator than by any of the methods above described. The procedure is

simple, rapid, and surgical. (See page 84.) This and similar methods of dilatation are of special advantage in dealing with severe internal diseases, such as tuberculosis, grave heart lesions, etc., for in such disturbances a longer process adds greatly to the danger from the affection.

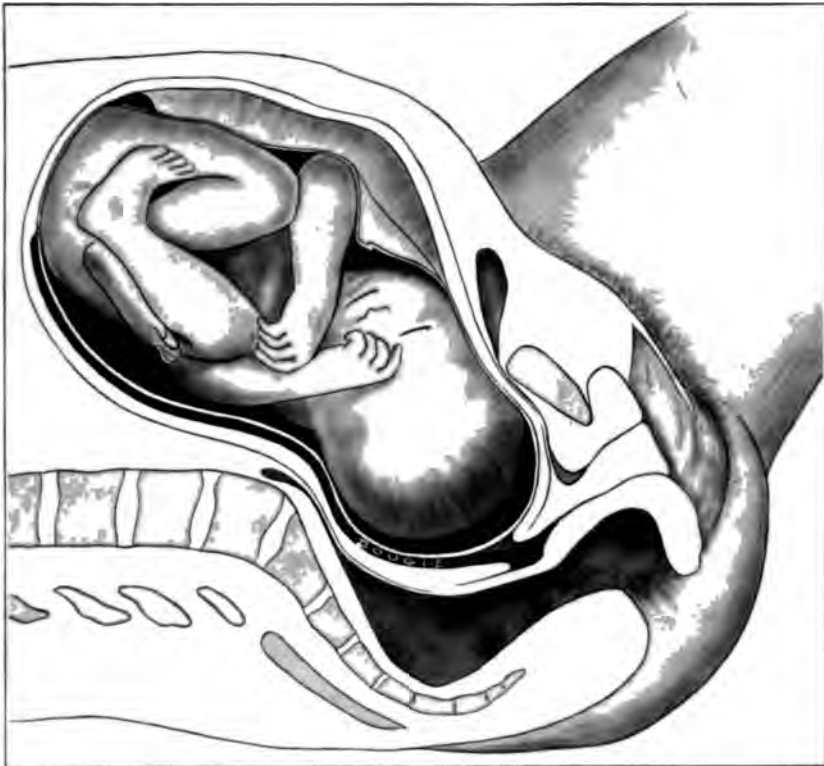


Fig. 19.—Kraus's method of inducing labor. A bougie has been passed between the amnion and the uterine wall posteriorly.

**The Vaginal Cesarean Section.**—The vaginal section, like the above method, is of service when rapid delivery is of importance. Pregnancy can be ended immediately by it, and the uterus emptied without the patient undergoing the process of labor. (See chapter on Cesarean Section, page 242).

### PROGNOSIS

The prognosis in artificial interruption of pregnancy depends largely on the indication demanding the operation and the conditions under which it is undertaken. For the mother the chief danger is that of infection. The manipulations within the parturient tract, together with the prolonged and artificial process of ridding the uterus of a perfectly natural growth before its time, involve no inconsiderable risk. While it was formerly a much more dangerous undertaking because of sepsis, it is now possible to carry out the procedure with comparative safety. Out of 2,200 cases reported by one large European clinic, there were only 13 deaths from infection.

Besides the risk of infection the procedure may be the occasion of a cervical laceration; but this is more a fault of technic than of conditions. Conditions do not often demand haste, and never undue force. Even with the Bossi dilator one can, with caution, dilate the cervix without injury; and, just as truly, it is possible for an operator to do extensive harm with such innocent objects as his fingers or a rubber bag.

The prognosis for the child comes into consideration only in the last weeks of pregnancy; and even then one may have to consider whether a viable child should not be sacrificed in the interest of the mother. And surely, with only a slight chance of saving its life, the mother's life should not be jeopardized. A prognosis under such circumstances must be very guarded. A live child is not the only thing to be desired: it must be viable. To be born only to breathe a few hours, does not count for much. A whole year must elapse before we can call such children safely past the dangers of their immaturity. In the 2,200 cases mentioned above, 1,721 children were alive when born, of whom 1,380 lived until discharged with their mothers; but only 81.2 per cent of these survived a whole year.

## CHAPTER IV

### THE ARTIFICIAL DILATATION OF THE CERVIX

The first stage of labor, or period of cervical dilatation, represents a counteraction of push and pull. The unruptured amniotic sac, or, if ruptured, the advancing part is pushed like a wedge into the cervix by the squeezing process going on in the uterus. A passive yielding of the cervical tissue is the result. The artificial methods of opening the canal, which most resemble this physiologic process, are (1) traction on the fetus made by attaching a weight to it, and (2) the use of the metreurynter similarly weighted. A more rapid dilatation can be accomplished with the fingers, the branched dilator, the forcible extraction of the child, or, more rapidly still, by incising the cervix. The formidable procedure of vaginal cesarean section, which can hardly be classified as one of the dilating operations, is also designed to accomplish the same end. The application of these various methods is indicated when, for any reason, it becomes expedient to open the cervix artificially.

**Weighted Traction Applied to the Fetus.**—We possess no means of applying slow and effective traction to the living fetus if it presents by the head; but, if it is dead, and the cervix dilated to the size of a half dollar, its scalp may be fixed in the grasp of a strong pair of toothed forceps to which a weight of two or three pounds is attached and allowed to hang over the side of the bed. In this way continuous traction may be exerted for several hours, and the head constantly drawn into the cervical canal; at the same time uterine contraction thereby is stimulated.

If the foot presents, continuous traction may be made, and with relative safety, on the living child, because of the convenient object that offers itself to take hold of. Mechanically, this is an advantage, serving the excellent purpose of dilating from within outward; but the risks are greatly increased for the

child owing to the difficulty experienced in delivering its largest and most important part last.

**Dilatation by Means of the Hydrostatic Bag.**—The action of the hydrostatic bag is twofold: it stimulates uterine contractions and dilates at the same time, thus simulating very closely the normal first stage of labor. The principal models of the instru-

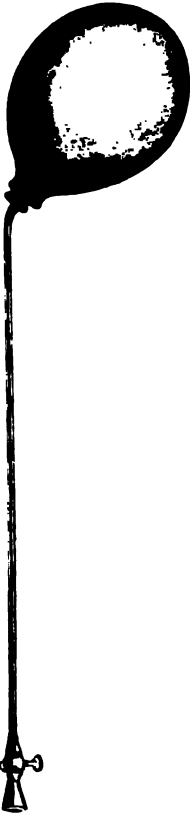


Fig. 20—Braun's rubber balloon.



Fig. 21.—Two sizes of Voorhees' hydrostatic bags.

ment are the Voorhees, Tarnier, Braun, and Champetier de Ribes. There are many others, but the technic of their use is practically the same. Owing to the limitations of their distensibility several sizes should be at hand. (Figs. 20, 21, and 22.)

The technic of hydrostatic dilatation is one of introducing into

the uterus through the cervical canal a collapsed bag which is withdrawn in a state of distention. (Fig. 23.) One or more of

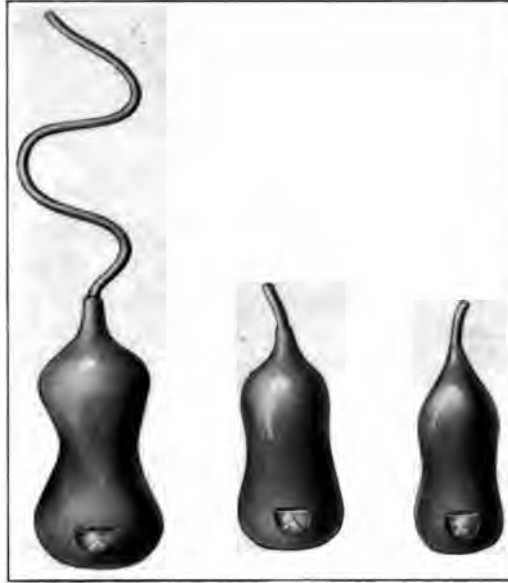


Fig. 22.—Three sizes of the Barnes fiddle-shape hydrostatic elastic dilators.



Fig. 23.—Hydrostatic dilator (small size) in its collapsed state, held with a dressing forceps and ready to be introduced into the uterine cavity.

these with a speculum, forceps (for grasping the portio vaginalis), a metal syringe of 100 to 150 c.c. capacity, and such other in-

struments as may be needed, are sterilized in the usual way. The patient is placed cross-wise on the bed, and the legs supported. Cleansing and disinfection of the parts must be as exact as in other surgical procedures. (Fig. 24.)

In using the Tarnier balloon one simply shoves it through the cervix with its metal tube, and injects it slowly and cautiously with a warm sterile solution. After it is distended to the desired degree, the stopcock is closed or the tubing clamped. The



Fig. 24.—Introducing the hydrostatic dilator.

larger sizes may be rolled lengthwise and introduced by the instrument designed for the purpose, or, which answers quite as well, with a pair of curved dressing forceps. Before introducing any of these devices one should have previously tested its capacity and competency; otherwise, one might inject too little or too much water, or find that the balloon leaks. There is an element of uncertainty about rubber which makes its use very unsatisfactory. (Figs. 25, 26, and 27.)

After the metreurynter has been put in position and distended, a cord is tied to the tube and brought over the side of the bed. A weight is attached that corresponds to the weigh of the water in the balloon, so that the number of grams in the weight of the one will equal the number of cubic centimeters in the capacity of the other. (Fig. 28.)

When the amniotic sac is still intact, the metreurynter will adjust itself between it and the uterine wall and may, in conse-



Fig. 25.—The dilator in place, now being injected.

quence, push the presenting part to one side. In conditions of overdistention, as in hydramnion or twins, it is almost necessary to rupture the sac before introducing the metreurynter; otherwise, there might be danger of rupturing the uterus. Also in low attachment of the placenta, the sac should be ruptured; for, if it is not, the distended bag will occasion serious hemorrhage.

As the metreurynter distends, the advancing part is pushed upward or to one side, the balloon itself comes to occupy the



place of the presenting part, or, perhaps, materially alters it. Usually, labor begins within the first half-hour. The average time taken to effect the complete opening of the canal being about six or seven hours, depending on the stage of pregnancy, parity, etc., of the patient. It may help to let some of the water out of the metreurynter, thus permitting it to insinuate itself more effectually into the canal. Later the water may be replaced and the bag again distended. The process of dilatation may also

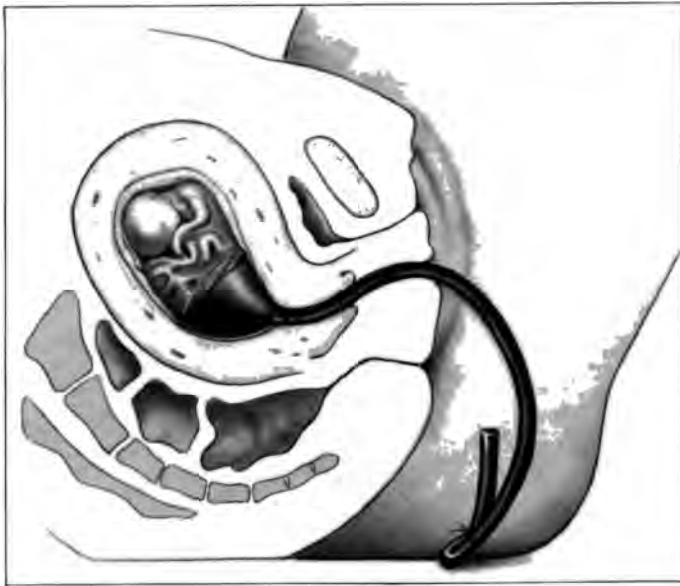


Fig. 26.—The dilator in position and distended with water, ready to begin dilatation by means of traction.

be hastened by making stronger traction on the tube either by pulling with the hand or by adding to the weight attached.

When dilatation has reached the full size of the metreurynter, which is manifest by its coming away, an examination should immediately be made to ascertain whether or not the position of the child has changed. If everything is found favorable, labor is allowed to go on naturally.

**Manual Dilatation.**—In the multipara it is often possible to pass a finger, sometimes two fingers, through the cervix before

labor begins, so that combined version may be attempted; but with the primipara it is generally impossible to accomplish much dilatation with the fingers, and unless the os uteri be easily dilatable, the manual method is not to be recommended.

**Dilatation by Means of Parallel Levers.**—Metal instruments with two or more parallel blades or arms, made to separate at their distal end by some sort of leverage applied with the hand,



Fig. 27.—Hydrostatic dilatation of the cervix, introducing the collapsed metreurynter. The posterior wall of the vagina is retracted, and the anterior lip of the cervix drawn upward and forward.

elastic band, or a screw device, are of considerable utility. The criticism made against their use is, that they sometimes do damage; but can not this be said of any instrument?

The Bossi dilator (Fig. 30) is a most ingenious and effective instrument for opening the cervix, and when cautiously employed is no more harmful than any contrivance or method intended to dilate rapidly. For a number of years it enjoyed

great popularity, especially in Europe, but other means of dilating the canal have for the time superseded it. One disadvantage of the Bossi dilator is, that all four blades must be introduced at the same time. This is not always easy or even possible when the cervix is tightly contracted; it then becomes necessary to begin the dilatation with a smaller two-bladed instrument. After the canal has been opened to the width of two fingers a metal cap with a broad surface is slipped over the tip of each lever of the Bossi dilator before carrying dilatation to its completion.

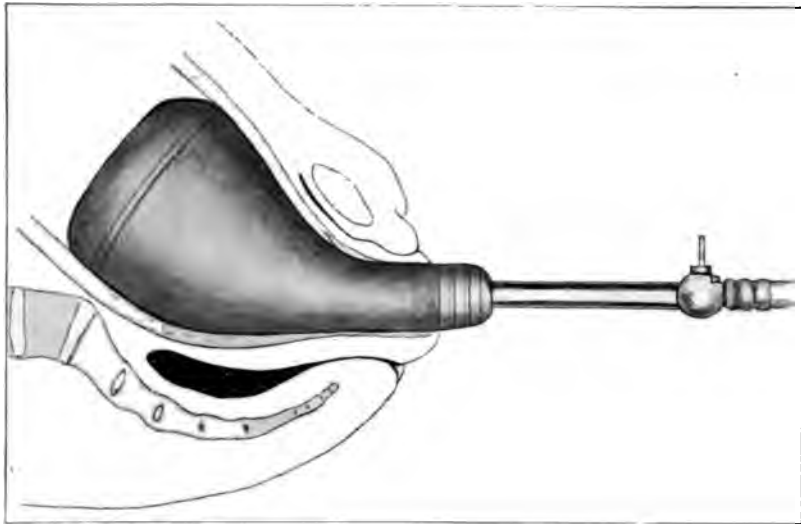


Fig. 28.—Champetier de Ribes metreurynter in position.

The surfaces coming in contact with the canal are corrugated to prevent slipping, and, when spread apart, the blades curve outward in a way to favor their retention within the uterus. The instrument is made with a pelvic curve, and has an index showing in centimeters the degrees of dilatation obtained (Fig. 29).

**The Leavitt Dilator and Method of Use.**—Some twenty years ago I invented an instrument (Fig. 31) for dilating the cervix which has the advantage of being simple in construction and easy of manipulation. It consists of four levers, and a handle having a large disc at one end and a small one at the other.

Each blade is notched near its middle, which fits into a suitable depression on the edge of the disc. The ends of the levers (the



Fig. 29.—Bossi dilator in operation.

blade part) are designed to enter the cavity of the uterus only so far as may be necessary to do the work required; the gynecic end is long and slender, the obstetric end short and broad. When

in position, dilatation may be carried on by compressing the proximal ends of the blades with the hand alone, with a rubber band alone, or, what is more practical, with both the hand and



Fig. 30.—Bossi metal dilator.



Fig. 31.—Leavitt metal dilator.

the rubber at the same time, the one supplementing the other. If intermittent pressure is desired, opposing levers can be compressed even while the band is doing its part of the work.

There are no screws to adjust, no hinges or joints to become

rusty, no detachable parts to get lost. There are only five pieces to the whole instrument, and they are plain and easily cleaned. It is self-retaining as soon as the second blade is in position. It is light, yet powerful enough to do twice the work demanded of it. It does not obstruct the field of operation; the process of dilatation can be closely watched, the parts sponged, and the presenting part palpated—all between the blades of the instrument. If the occasion demands greater haste, multiple incisions after the method of Dührssen can be made between the blades.

In using the instrument the patient is brought to the edge of the table and the knees separated; and the posterior wall of the vagina is depressed with a speculum. The Edebohls' speculum is very serviceable, as it is self-retaining when weighted; besides, it serves to relax the perineal tissues. The first lever of the dilator is introduced up to the projection on its blade. On this lever is placed the fulcrum of the handle, the notch of which fits into the notch of the lever. A second lever is similarly introduced opposite to the first. A small sterile rubber band is then slipped over the free ends of the levers, not for purposes of dilatation, but simply to keep the levers in place. As each of the two remaining levers is introduced and adjusted to the handle, the band is made to include it in its grasp. When all four levers are in position, active dilatation is begun and maintained by a strong rubber band wound about the proximal ends of the levers. As dilatation progresses, and the ends of the levers are brought together, the band should from time to time be reapplied. (Fig. 32.)

Dilatation should be carried on slowly. It is rapid enough if in the course of every two or three minutes it increases half a centimeter in diameter. Bossi himself takes an hour or more for the operation, and continually awaits the assistance of natural labor pains. If one forces the process so that the tissues do not have sufficient time to stretch, there is danger of lacerating the cervix. Cases have been reported where, with the Bossi dilator, the tissues have been torn beyond the vault of the vagina into the parametrium. To avoid such injuries the instrument should be used in first births only when the cervix has become obliterated



Fig. 32.—Dilatation of the cervix with the Leavitt dilator. The smaller end of the levers and the smaller fulcrum of the handle are being used. The amount of dilatation to be gained is approximately one-half as much as can be accomplished by reversing the levers and handle.

and only the external os remains to be opened, or when in the multipara the whole cervix is relaxed and dilatable. When sufficiently opened, the forceps may be applied; or, if the child is dead, craniotomy performed. It is doubtful if the uterine supports become seriously injured thereby.

**Dilatation Through forcible Extraction of the Child.**—In incomplete dilatation of the cervix the forceps may be applied to the advancing head, and the process hastened by means of traction, especially in a multipara with dilatable soft parts. The same procedure may be carried out in first births, but one must bear in mind the greater resistance of the tissues and the increased risk of laceration; also that, not only the external os, but the internal, as well, must be dilated, since the latter offers as great resistance as the former. In a case permitting cranioclasia, delivery may be effected if the cervix has dilated to the size of a silver dollar.

Dilatation may also be secured through forcible extraction by the feet, whether they come down spontaneously or are brought down purposely. The extremity furnishes an exceptionally good handle, though it must not be pulled hard enough to cause injury to the child. One must also bear in mind the wedge-like action involved, and give ample time for dilatation to take place. If incomplete, the child's arms become extended above the head, and not only is valuable time lost in freeing them, but, after bringing them down, there is the further complication of an undilated cervix clamping itself so tightly about the baby's neck that in forcing the delivery the cervix is likely to be seriously torn; besides, the danger from asphyxiation is greatly increased. (See chapter on Breech-birth, page 141.)

**Cervical Incisions.**—In complete effacement of the cervix the external os alone remaining undilated, resistance may be overcome by means of incisions. These are made to extend up to the vaginocervical attachment, and give ample diameter for the child to pass, unless the supravaginal part of the cervix or the vaginal vault itself offers resistance. The thinner and more drawn out these tissues, the higher the section can safely be carried. The cases best suited for the operation are those of



first births with the head presenting. The spontaneous obliteration of the cervix leaves only a paper-thin os uteri to cut.

The technic is simple. After carefully preparing the patient, the mouth of the uterus is exposed, and the incisions made; or they may be made entirely under the sense of touch. The ring of tissue is cut in the median line posteriorly and on both sides up to the posterior vault of the vagina. If these three incisions appear insufficient, another may be made anteriorly, though one should be more solicitous about this last since a laceration may cause it to continue on into the bladder. If one depend entirely upon the sense of touch, the whole hand is passed into the vagina; one finger is made to lie between the head of the child and the os, another just outside on the portio vaginalis; the cervix close to the palmar surface may then be safely cut. Generally there is but little bleeding, and unless the incision is extended by laceration, suturing is not necessary. Delivery can usually be completed with the forceps. If turning and extraction is undertaken, the danger of an extending laceration is increased.

Instead of three deep incisions, numerous notches half a centimeter long may sometimes be employed to equal advantage.

**The Vaginal Cesarean Section.**—This is a much more formidable procedure and is discussed further on.

### Remarks

Dilatation of the cervix is indicated in about 3 per cent of all cases. The operation is practically without danger.

Because of the injuries sustained, and the inviting field they offer for inoculation, the more rapid the dilatation, the more dangerous the operation becomes.

If the case demands haste, one may take greater risks, as, for example, in eclampsia and in heart and lung diseases.

A matter of a few minutes seldom results seriously. It would hardly be advisable to resort to the elastic balloon in the presence of a rigid os uteri. A vaginal cesarean section might save a life.

The choice of procedures must depend on the exigencies of the case.

The principal indications for undertaking the rapid dilatation

of the cervix are eclampsia, serious affections of the heart and lungs, premature detachment of the normally situated placenta, and the infectious fevers.

One is warranted in choosing the more rapid methods, if, in the interest of the child, they can be carried out without increasing the dangers for the mother.

Placenta previa offers an important contraindication to any form of dilatation for the obvious reason that the procedure lacerates tissues which bleed profusely; but when it is done it should be done rapidly, and the dilatation carried to the limit.

### COLPEURYSIS

A few words may be added with reference to the hydrostatic bag as used in the vagina: (1) When distended in the anterior fornix, it excites the uterus to greater activity; (2) when the advancing part of the child does not sufficiently close the pelvic girdle, as, for example, in cross-births, foot presentations, and contracted pelves, the amniotic fluid is forced in such quantities into the lower pole of the fetal ovoid that the sac stands in great danger of becoming prematurely ruptured, which would not only delay birth, but would add to the difficulty of performing some of the simpler operations of delivery. By means of the colpeurynter sufficient counterpressure may thus be afforded to prevent the sac from rupturing.

It is also of use in placenta previa, especially while the patient is being conveyed to the hospital. It acts as a tampon, taking the place of vaginal packing.

In first labors the vagina is usually so tightly contracted that the hand, if for any reason it becomes necessary to introduce it, can be passed only with great difficulty and with more or less injury to the parts. To prepare the canal for such an ordeal, the colpeurynter serves a very useful purpose. Inserted into the vagina, distended with fluid, and then slowly withdrawn, the tissues become so relaxed after several repetitions of the treatment that manual investigations and maneuvers can be carried on without doing serious damage.

**Technic of Colpeurynter.**—The bag, a curved dressing forceps,

and a piston syringe of 100 to 150 c.c. capacity are sterilized. The patient and operator are properly disinfected. The colpeurynter is folded lengthwise and grasped with the forceps or with the fingers of the right hand. With the left hand separating the labia, the balloon is pushed high up in the vagina and held there while an assistant, usually a nurse, injects it with a mild antiseptic solution. When fully distended, the tubing is clamped with an artery forceps, and the patient returned to bed. If not expelled by the end of six hours, the bag should be emptied and removed, and an examination made to see if the obstetric situation has altered. The one treatment ought to be long enough to accomplish the end sought, but the colpeurynter may be introduced a second time, and left another six hours. A longer period will cause serious injury to the epithelium of the vaginal mucous membrane.

If the bag is used for the purpose of regulating labor pains, the effect is not always immediate; it may take an hour or more, or it may even fail altogether. Upon its spontaneous expulsion the vagina and introitus will be found relaxed, and not uncommonly the cervix and os uteri, as well.

It is recommended that the colpeurynter and other devices made of gum rubber, be preserved in glycerine, or, at least their surfaces smeared with this substance, when they are put away for further use.

## CHAPTER V

### OPERATIONS DESIGNED TO INCREASE THE PELVIC DIAMETERS

When the diameters of the bony pelvis bear such relation to the size of the fetus that the child's head can not pass without endangering the life of the mother or the baby itself, it is possible, within certain limits, to enlarge the pelvic ring sufficiently to permit of safe delivery. This increased diameter is gained by severing the pelvis in front, thereby allowing the ossa innominata to swing outward on their sacral hinge. The muscles attached laterally will not of themselves act powerfully enough to do any particular harm, but the forces of labor, increased by operative procedure, such as forceps or extraction, can cause most serious damage. The limit of relative safety is reached if the disunited pubes is separated 4 to 6 cm. It has been experimentally established that by spreading the pelvis apart to this degree the conjugata vera will be increased 1 or 2 cm., and the transverse diameter 2 or 3 cm.

The pelvic widening operations consist either in separating the bony ring at the symphysis (symphyseotomy) or in sawing it apart a little to one side of the symphysis (pubiotomy).

For the intelligent understanding of these operations, and the injuries which accompany them, the following anatomic knowledge is important:

**Anatomy.**—The symphysis is a fibrocartilaginous joint uniting the two pubic bones in front, and has a distinct synovial cavity. The superior pubic ligament above and the inferior pubic ligament below, bind the bones together. The internal pubic artery supplies the soft parts on the anterior surface. In front and below is found a rich plexus of veins, which gives off branches to the lower border of the os pubis and its periostium through

which it is closely connected with the clitoris. The veins surround the clitoris, which is made fast to the symphysis by the suspensory ligament. On both sides near the introitus vaginæ close to the vaginal wall, is found the bulb of the vestibule, which converges with the clitoris. It is here that the essential connecting branch is found which unites the plexus with the veins of the pelvic outlet. In this way the plexus is connected with the venous plexus of the vulva and vagina, with the urethral and hemorrhoidal veins, and with the obturator veins and veins of the muscles.

On the posterior surface of the symphysis are found important arterial branches to the rami of the pubes and to the obturator artery, between which, oftentimes, there is an anastomosis, the so-called "funeral-wreath" artery.

The bladder lies back of the symphysis, usually a little to the right of the median line, and somewhat separated from the pubes by a layer of fat and connective tissues, forming what is known as the prevesical space, or space of Retzius. The upper section of the bladder lies closer to the symphysis and the pubic bones than the lower. The ureters pass along the posterior wall of the pubes, but not in contiguity with them. The urethra is separated from the arch through the structure of the clitoris. Very few vessels are to be found in the tissues between the bones.

### INDICATIONS AND PREPARATIONS

The only indication for undertaking any operation whose object is to increase the size of the mother's pelvis, is the disproportion which sometimes exists between her own osseous structures and the head of the child. If this disparity is very marked, neither symphyseotomy nor pubiotomy are indicated at all. But should the history of former labors show that delivery was effected only with difficulty, the head refusing to enter the superior strait, and should the measurements show a moderate degree of contraction, the operation is one that may be considered. One must be thoroughly convinced, however, that the dystocia is due only to anatomic disproportion, and that neither the cervix nor the amnion is responsible for the resistance.

The types of inadequacy most frequently met with are the

simple flat, the flat rachitic, the generally contracted, and the funnel-shaped pelvis.

The competing operations are the abdominal cesarean section, craniotomy, induction of premature labor, version, and the use of forceps.

Inasmuch as the operation is expected to give the additional space required for the safe passage of the child, and the fact that this increase is safe only to a certain degree, it is exceedingly important to know the exact size of the patient's pelvis before undertaking its separation; and anyone competent to perform so grave an operation should be skilled in pelvic mensuration.

If the child's head is of average size, the following dimensions are said to be within the limits of utility: in flat pelves a true conjugate of 7 cm. and upward; in the generally contracted pelvis, 7.5 cm. and upward. Having these diameters to start with, the separation of the pubes will allow the head to pass, especially since the severed bones admit a considerable portion of the child's head into the gap between their severed ends. And while it may be possible in exceptional cases to deliver in even greater degrees of pelvic contraction, the procedure is unsafe and not to be recommended. Only when the disproportion is such that an increased conjugata vera of one or perhaps two centimeters is sufficient, should pubiotomy or symphyseotomy be undertaken. A true conjugate below this would be an indication for cesarean section.

A second and equally important fact to be determined before proceeding to operate, is, that the child is alive; otherwise embryotomy would be the proper procedure.

Again, the soft parts of the mother should be yielding. Since the pubic bones furnish the chief support for the bladder, urethra, and upper portion of the vagina, their wide separation subjects these structures to great violence. In the primipara the parts are very tight and unyielding, and for this reason alone pubiotomy and symphyseotomy are not often performed in first births. Severe traumatisms may also occur in the multipara if delivery is rapid; the labor should be allowed to progress spontaneously, or even retarded, in order to allow the tissues time to stretch.

Besides the actual damage sustained, which may be very serious to the bladder, all wounds become dangerous in the presence of the lochial discharges.

The birth canal must be aseptic. If the general condition is good, and the pulse slow and strong, one may undertake the operation without much fear; but with unmistakable signs of infection, perforation and cranioclasis, even if the child is alive, is entitled to consideration. One shudders at the thought of taking life, but there are a few situations in obstetrics in which the unborn child may have to be sacrificed rather than subject the mother to the danger of losing her own.

Finally, the operation should be performed only in the hospital and by an experienced operator.

### SYMPHYSEOTOMY

There are two methods of severing the pubes at the symphysis, the open and the closed.

**The Open Operation.**—The vulva, vagina, abdominal wall, and the inner surfaces of the thighs are disinfected after approved methods, and the bladder catheterized. With the patient in the dorsal position, the separated knees held by stirrups or supported by assistants, the skin, fat, and fascia are incised down to the bone transversely over the symphysis. By blunt dissection the connective tissue is freed, and the bladder and urethra isolated. Bleeding is only moderate and easily controlled by pressure. The finger is now pushed to the under surface of the articulation, in which position it acts as a guide to the knife (a blunt-pointed bistoury) with which the joint is severed. Union is not always directly in the median line, it may be deflected to one or the other side. In going through the inferior arcuate ligament, the clitoris is in danger of being wounded, and must be guarded. The joint can be felt to separate, and care should be taken not to spread the knees apart with much force for fear of lacerating the soft parts overlying the symphysis. The wound is now packed with gauze, an elastic binder brought around the pelvis, and labor allowed to go on naturally. Spontaneous birth is to be expected.

In case delivery does not follow in due course, or should there arise any indication for its immediate termination, further aid must be offered. A small dose (5-7 minims) of pituitary extract should be given and its effect awaited before resorting to forceps. Failing then, perforation and cranioclasia become necessary. The chief objection to the whole procedure is that a little disproportionate force can do a great deal of damage. This must constantly be borne in mind.

After labor is over, the elastic bandage is removed, the gauze packing taken out of the wound, the periosteum drawn together with catgut, and the wound closed. Some operators advise drainage through a counterincision in the labia majora; but this is not necessary if the operation has been aseptically performed. The after-care is essentially that of a normal puerperium. A little anxiety is felt as to the bladder and urethra, and for the first day or two the patient may require catheterization.

**The Closed or Subcutaneous Operation.**—Through a small incision made in the linea alba the finger is pushed beyond the symphysis into the space of Retzius, and the bladder shoved out of the way of harm. With a small blunt-pointed knife the cartilage of the joint is incised to a depth of four to five centimeters. A carrier needle (Bumm's or Döderlein's) is entered one centimeter above the upper border of the clitoris, and directed downward around and upward close to the symphysis, the point passing through the lower border of the inferior arcuate ligament and appearing in the space between the symphysis and bladder. A Gigli saw is now fastened to the eye of the carrier, and drawn into position for sawing. Three to five back-and-forth movements are sufficient to sever the ligaments and cartilage. The incision made over the pubes is closed and the patient put to bed, and, as in the open method, labor is allowed to complete itself.

Should some of the fibers of the arcuate ligament still hold, it is possible to sever them with a tenotome introduced through the puncture made near the clitoris. With the index finger of the left hand in the vagina directing the course of the bistoury, fiber by fiber of the ligament can be cut.

The knees are kept together for several days, but outside of



the dressing of the wound itself no further bandaging is required. Union takes place more rapidly than after the open operation.

### PUBIOTOMY

**The Open Method.**—To one side or the other of the symphysis,

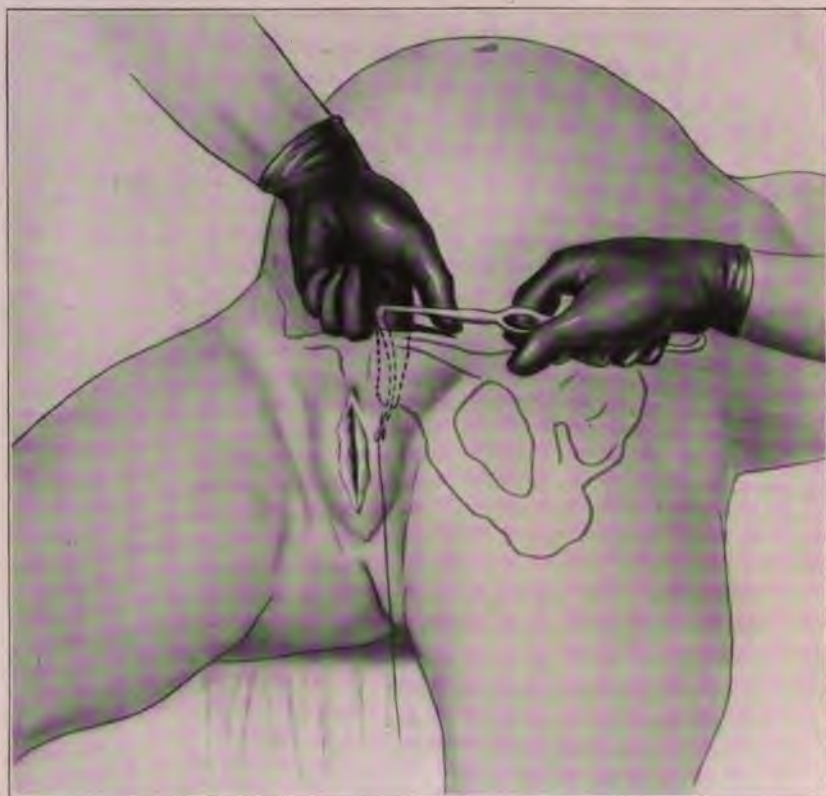


Fig. 33.—Pubiotomy, open method. An incision is made over the os pubis into which the index finger of the left hand is passed, and the soft parts, especially the bladder and urethra, pushed away from the bone. The saw carrier is then passed between the finger and the bone. (From Döderlein and Krönig.)

the left being preferred, the os pubis is cut down upon and laid free to its periosteum. With the finger, directed posteriorly, the soft parts are separated from the bone, a Gigli saw is carried around the os pubis at a point midway between the

tubercles of the os pubis and the origin of the adductor longus muscle, and the bone is sawed apart. All bleeding arteries are



Fig. 34.—Pubiotomy, open method. Fig. 33 shown in sagittal section. (From Döderlein and Krönig.)

ligated and the veins clamped, the parts temporarily dressed, and an elastic binder applied around the hips. After delivery the

incision is sutured together with catgut and the surface of the uterus is closed by a crescent-shaped incision with its base at the

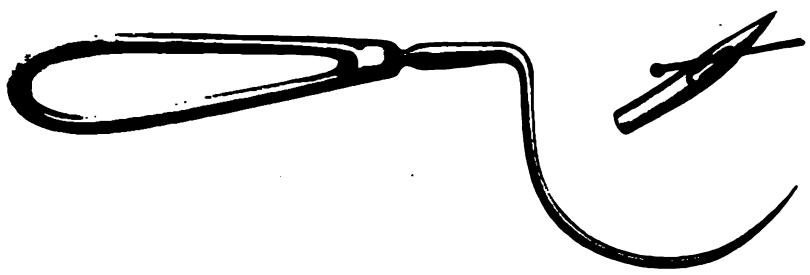


Fig. 1. Inserting my needle.



Fig. 2. The needle is taken in the right hand and the left hand within the vagina guiding the needle.

median line, exactly as in the subsequent steps of the operation. We struggle out. Drainage is not necessary. A

firm binder is placed about the pelvis to be worn for several days. (Figs. 33 and 34.)

**The Closed Operation—Bumm's Method.**—A saw carrier (Fig. 35) grasped firmly in the right hand is entered between the large and small lips of the vulva at a point opposite the clitoris. The point of the needle is directed toward the lower border of

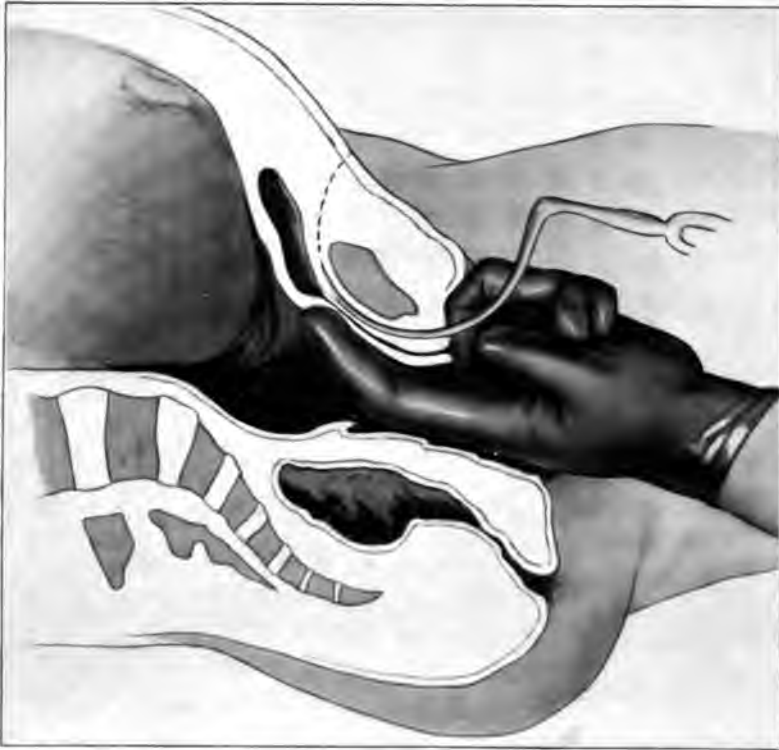


Fig. 37. Pubiotomy, subcutaneous method. This is Fig. 36 shown in sagittal section. (From Döderlein and Krönig.)

the pubic bone, and, with the index finger of the left hand in the vagina as a guide, the needle is driven around the pubes, coming out at its upper posterior border. The point of the needle, showing beneath the skin of the mons veneris, is cut down upon with the scalpel. It is also well to make a stab wound with the point of the scalpel where the carrier is to enter:



Fig. 38. Subcutaneous pubiotomy. The needle has been passed around the pubic bone from below upward; and a Gigli saw attached to the eye of the needle is about to be drawn into position for sawing. (After Bumm.)



Fig. 39.—Subcutaneous pubiotomy. The wire saw has been drawn through, and the handles affixed ready for sawing apart the pubic bone. (After Bumm.)

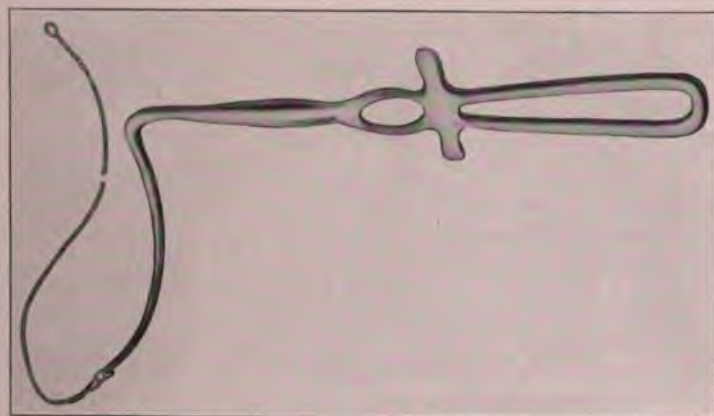


Fig. 40.—Döderlein saw carrier and saw.



otherwise the needle, which is rather blunt, will be forced through the integument with considerable difficulty (Figs. 36 and 37).

To the protruding end of the needle a Gigli saw is now made fast and the carrier withdrawn, bringing the saw with it (Fig. 38). The knees are held together, handles affixed to the ends of the saw, and, with the utmost precaution, the bones severed. (Fig. 39). As a rule there is not much hemorrhage; and what there is, is easily controlled; but should it persist in spite of pressure, the closed wound may have to be converted into an open one and the vessels secured.

The woman is urged to deliver herself if she can; but must be assisted if she can not. Afterward the parts receive a final inspection, and all lacerations are repaired. The bladder should be catheterized, and, if the urine is bloody, a self-retaining catheter should be left in for twenty-four to thirty-six hours. The pelvis should be supported with a firm bandage at least a few days.

Döderlein's method differs from the foregoing in that the saw carrier (Fig. 40) is passed from above downward, making its exit near the clitoris. It has no advantages. The shape of the Döderlein pubiotomy needle is like that of a Dechamp ligature carrier, only it is much larger.

### THE PROGNOSIS

In 228 symphyseotomies performed after the open method, quoting from Hammerschlag, the maternal mortality was 8 per cent. In 77 pubiotomies, also performed after the open method, the mortality was 10.5 per cent. Compared with the subcutaneous method: in 17 cases of symphyseotomy the mortality was 6 per cent; in 700 pubiotomies it was 4.4 per cent. The infant mortality was 8 per cent in the symphyseotomies and 9 per cent in the pubiotomies, regardless of method.

As regards the relative safety of symphyseotomy and pubiotomy there is little difference; but in both the mortality is considerably higher by the open than by the closed method. This is due to its greater liability to become infected. On the other hand, the injuries are more hidden when done subcuta-

neously, as it is sometimes especially difficult to control bleeding; and occasionally a death has resulted therefrom.

The lacerations accompanying either operation may be numerous and extensive. Bladder, urethra, and vagina, to some degree suffer, either from the operation itself or in the delivery which follows; and all such lesions are likely to be extended if the child is delivered hurriedly and with force. Spontaneous birth, therefore, is to be preferred, and ample time should be given the tissues to dilate. The bladder and urethra are more

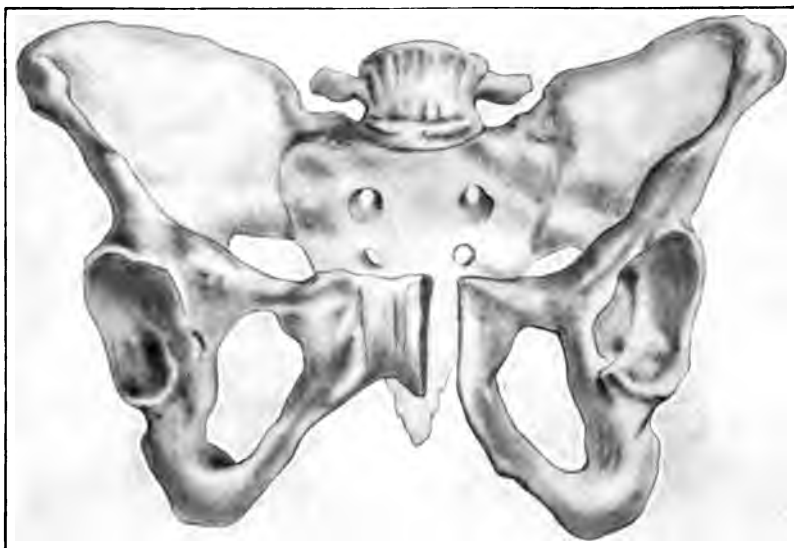


Fig. 41.--The pubiotomized pelvis.

likely to suffer injury in the symphyseotomy than in the pubiotomy, since their attachment is more intimate in the median line than laterally. Owing to the occult character of such injuries, it is essential after every such operation to catheterize the bladder to prove the presence or absence of blood in the urine. A severe laceration may result in a vesicovaginal or a urethrovaginal fistula, which later will require surgical correction. Many of the lacerations occur in the vicinity of the surgical wound, and enhance the dangers of infection by their contiguity.

One may obviate tears about the pubic wound, if they appear



imminent, by incising the vaginoperineal wall (episiotomy), thereby relieving the tension anteriorly.

The course of recovery is usually without morbidity. The development of a hematoma, or the formation of a thrombus or, possibly, an embolus, has to be borne in mind. Sometimes a hematoma becomes infected, developing an abscess that requires evacuation and drainage. If there be good reason to fear embolism, the patient should be kept in bed for five or six weeks.

To escape just condemnation one must select one's cases wisely, for neither symphyseotomy nor pubiotomy has a very broad field of usefulness, and should be undertaken only in exceptional, well-studied situations. Their limitations must be known. To misjudge proportions; to separate the pelvis when the fetal head will not spontaneously engage, and can not be made to engage; to perform the operation before labor has been thoroughly tested, must all fall short of success. Only a slightly increased diameter is gained, anyway, and this mostly in the transverse diameter. And after the pubes have been separated, delivery must take place through a disorganized canal upon whose integrity normal mechanism so much depends.

In considering the sequels of the operation, three things are to be kept in mind,—the nonunion of the pelvis, the development of hernia, and the influence the operation may have on a subsequent pregnancy.

In the open method complete recovery may take two or three months. If infection takes place in the symphysis, the joint may never firmly unite, but often will if the infection occurs in the pubiotomized bone. Here union will go on undisturbed.

The development of hernia is favored by pubiotomy more than by symphyseotomy, but in neither is it very likely to occur.

What effect can the operation have on subsequent labors?

For one thing there is a slight but permanent increase in the diameter, both in symphyseotomy and pubiotomy. For this reason pubiotomy has been performed before the expiration of pregnancy, or even in anticipation of pregnancy, with the hope that sufficient space might thereby be gained to make spontaneous birth possible. If pubiotomy must be repeated, it is recommended that the section be made on the opposite side.

The results for the child, in whose interests the operation is performed, are not so good as in cesarean section. As already noted, separating the pelvis is only one step in the delivery. All the usual casualties of birth are still to be met. These are considerably lessened if labor goes on spontaneously, but take on very serious aspects when further obstetric operations, such as the application of forceps or version, have to be resorted to.

In comparing the various methods, the subcutaneous introduction of the wire saw, after the method of Bumm, is the simplest and quickest; the partial open method of Döderlein, though somewhat more complicated, affords greater protection to the bladder and urethra. Each procedure possesses advantages that make the two equally serviceable.

Symphyseotomy and pubiotomy are operations to be recommended only after the cervix has been fully dilated; after active labor has been given a fair trial; when the advancing head is in partial engagement or arrest; after a reasonable attempt to deliver with forceps; and after determining that the child is alive. Even then, cesarean section, all things considered, is probably the better operation.

## CHAPTER VI

### THE CORRECTION AND TREATMENT OF FAULTY ATTITUDES AND PROLAPSED PARTS

The normal attitude of the fetus is one of flexion. The body lies bent upon itself, the chin pressed against the breast, and the extremities folded over the chest and abdomen. The concavity thus formed surrounds and protects the placenta and cord. Derangement of this most favorable adaptation of embryo and placenta is accompanied by various and, sometimes, serious consequences. Change this attitude of flexion to one of extension, and the fetal ovoid becomes distorted, the extremities wander, the cord slips out of place—all being variations from the normal which become more or less serious for both mother and child.

**Conversion of Face and Brow Positions.**—Presentation by the face generally comes about from a weak labor and a contracted pelvis, and engagement is delayed and extension favored. If observed early, the face may be converted into a vertex after the following method:

One hand (the right in left, the left in right, positions) is passed along the face, brow, and top of the head to the occiput, which is grasped securely and drawn downward. At the same time the outside hand is pressed against the bowed thorax of the fetus while an assistant makes counterpressure on the breech (Fig. 43). Baudelocque considered the single hand within the uterus quite sufficient to effect the conversion, and Schatz was able to correct the displacement by external manipulations alone; but the combined method, undoubtedly, is best, especially in the more marked degrees of extension. The success of the operation presupposes that both mother and child are in good condition, that the soft parts are dilated or easily dilatable, and that the head is movable. After correcting the attitude, labor may be

expected to go on normally and end spontaneously, though it must be borne in mind that the manipulations can induce asphyxia of the child, and make rapid delivery imperative. In getting past the head with the hand, and especially in reducing the malposition, there must be a certain amount of mobility and relaxation of the parts. The following contraindications to the pro-



Fig. 42.—Vertex presentation in the oblique diameter. The amnion is still intact, and must be ruptured before applying forceps. (After a frozen section by Braune.)

cedure have value: a contracted pelvis, prolapse of an extremity, low implantation of the placenta, and a prolapse of the cord.

After flexion has been secured, the patient is turned on the side corresponding to the back of the child, the occiput lying within the pelvis or at least engaged at the brim. Since such manipulations always augment the possibilities of asphyxia, the fetal heart should be listened to at frequent intervals.

Closely associated with the face position is that of the brow.



Fig. 43.—Thorn's manipulation. The attempt is made to bring down the occiput with one hand while with the other pressure is made against the child's thorax from the outside. At the same time an assistant makes pressure in an opposite direction on the breech.

In the milder degrees of extension, version may be indicated, or possibly the brow converted into a vertex. Failing in this, it may be brought into a frank face by hooking the fingers into the child's mouth and drawing the chin down. The following case illustrates how such an anomaly may be managed:

Thirteenth labor. First position of the brow, head remaining well above the symphysis. Contraction ring so tight about the neck that the introduced hand could not pass beyond it. Attempt to turn abandoned; instead, its conversion into an occipitoposterior position was undertaken. With the left hand the brow was pushed upward and to the right, the external hand simultaneously making pressure downward on the occiput. An assistant meanwhile urged the breech toward the left. The maneuver was successful, and a spontaneous birth of a living child followed.

**Reposition of an Extremity.**—When the posture of the fetal ovoid is such that the uterine wall does not embrace it snugly, a fetal extremity may become dislodged, and find its way alongside or in front of the advancing part. In a cross-birth, for example, the contracting ring of the uterus can not with uniformity adjust itself about the child's shoulders, so that a hand or a foot easily becomes displaced along the path of least resistance. (Fig. 44.) In breech positions, too, the irregularity of the buttocks prevents uniformity of pressure, and prolapse of one or both feet may result. Nor would it help matters to replace the extremity, because there is nothing to keep it from recurring.

In vertex positions it is different. Owing to the spherical form of the child's head and its more perfect adjustment to the contracting ring, it is unusual for an extremity to become displaced. It does, however, occur with relative frequency in face positions and in pelvic deformities, also in hydramnion, and where the use of the metreurynter has caused displacement of the head. When the head, which is seldom a factor in the development of anomalous attitudes of the fetus, allows an extremity to slip past it (Fig. 45), postural treatment will generally correct the displacement if the amniotic sac is still intact, as demonstrated by the following instance:

A tripara. Normal pelvis. Fetus in left vertex position, with the head deviated to the left. Sac unruptured; cervix partially dilated. Through the membranes could be felt the left forearm and hand lying near the head. The



Fig. 1. Breech position. (The original drawing by Schaefer.)

... to the breech, extension, and attempts to replace the fetus. ... wait until the cervix is fully dilated ... to the breech's reposition. The complicating mem-

ber is then pushed up past the head, the sac ruptured artificially, and the head pressed from above into the superior strait. As

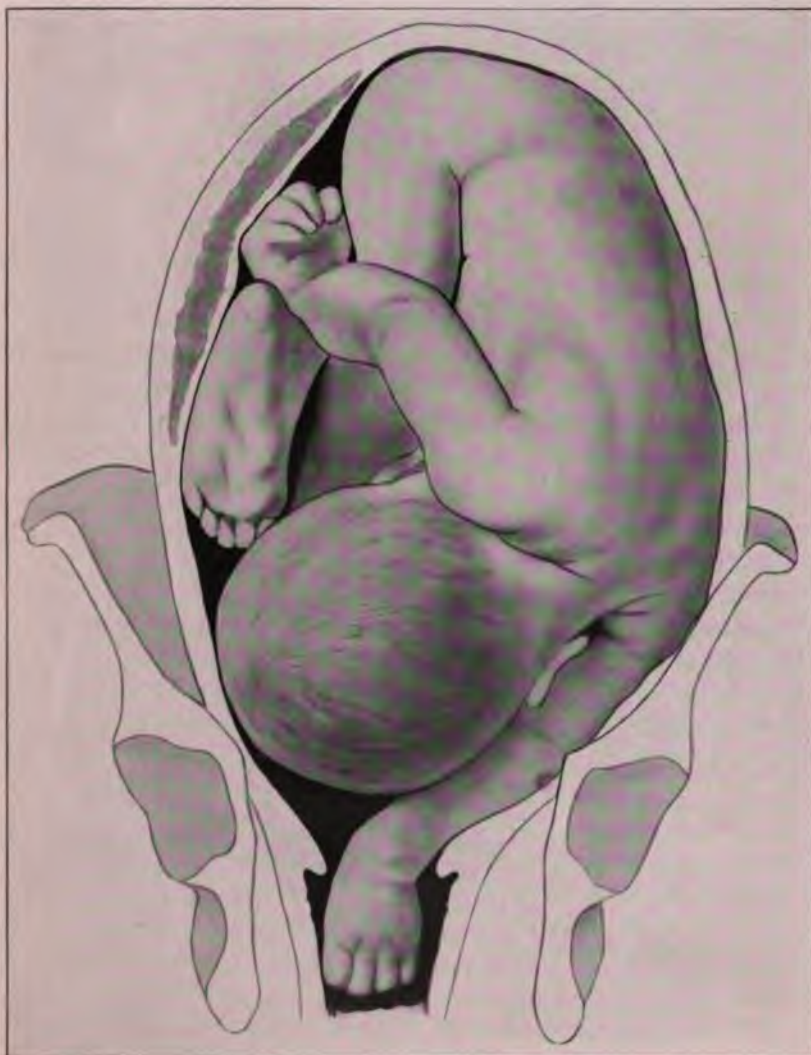


Fig. 45.—Prolapse of an arm, left occipitoposterior position. (Bumm.)

the water drains away, the head becomes fixed, and recurrence of the displacement is prevented. To carry out this maneuver



the patient must be in a favorable position for operation and be anesthetized. The whole hand is passed into the vagina (in left positions, the right hand; in right positions, the left hand), and the prolapsed member is grasped and pushed up over the face beyond the chin. With the external hand the head is now pressed into the pelvic opening and held until anesthesia passes off and the contractions of the uterus secure the head at the inlet. Labor is allowed to progress with the patient lying on the side to which the fetal back is turned.

With the expectation that spontaneous delivery will follow, reposition of the prolapsed extremity is undertaken only when there are no indications for rapid delivery and no undue obstruction. If the head alongside the prolapsed arm enters the pelvis, the treatment is expectant, since birth will go on spontaneously in spite of the anomaly. Small fetuses are not rarely born in this way. Should rapid delivery be indicated, the forceps is employed, care being taken not to include the prolapsed part in its grasp. If the child is dead, perforation has its place.

It may sometimes happen in undeveloped or macerated fetuses that a lower extremity, instead of an arm will come down. The management is the same, the extremity replaced and the patient put on the side. If reposition be impossible, or should both a foot and an arm present, it would be best to pull the leg down and push the arm up, that is, convert it into a breech. Even then an arm will sometimes persist in prolapsing; but no treatment is needed, as the condition will take care of itself.

**Reposition of the Cord.**—The best way to deal with this anomaly is through immediate delivery, but this is only practicable if the soft parts are well dilated and relaxed. Should compression occur at a time when labor can not be rapidly completed, reposition may be effected and the danger obviated.

Since compression of the cord is of importance only as it endangers the life of the child, it calls for no consideration if the child is dead or nonviable. Success through immediate delivery is gauged by the clock. A few minutes of interrupted circulation, and the child is lost. And, as the head is the only part of the fetus that is able to prevent the reposed cord from again falling, its reposition in any other position is practically useless, though

sometimes, if one has it ready at hand, a metreurynter may be used in lieu of the head to keep the cord out of the way of harm until full dilatation makes rapid extraction possible. Occasionally, one may succeed in hanging the cord over one of the fetal extremities. The method of procedure is as follows:

Patient and surgeon undergo the usual disinfection. The vaginal douche may be omitted altogether, or, if given, must be given cautiously, as the manipulations within the vagina may cause harmful pressure on the cord. Narcosis is essential to success. Without it the patient is likely to resist, especially when the hand is introduced into the vagina. Anesthesia also modifies the force of the uterine contractions, which, for a few moments, is desirable.

The patient is brought to the edge of the bed, lying on the back, thighs flexed, knees everted. An operating table when accessible is always to be preferred. The hips should be elevated a little higher than the head, a position favoring reposition by gravity. This is easily secured by placing one or more pillows under the buttocks as the patient lies crosswise on the bed.

The left hand is introduced in left positions of the fetus, the right in right positions. The cord is grasped with as many fingers as the opening in the uterus will admit, and passed over the child's face and planted as high up as possible. Before withdrawing the fingers, it is well to stimulate a contraction by rubbing the uterus with the other hand. As the contraction comes on, the head is grasped externally and pressed downward as the fingers are withdrawn, the object being to keep the cord above the engaging head. If the reposition has been successful, and the head lies fixed in the lower segment of the uterus, the patient is returned to bed, and labor is allowed to go on naturally. Should the cord again slip out of place, the procedure is repeated, preferably with the patient in the knee-chest position. This posture produces a negative pressure within the uterus that makes reposition easier; but narcosis is not so conveniently secured, and may have to be omitted.

A point worth remembering is, that light pressure on the cord continued for a long time is more dangerous than firm pressure applied for a short time. Hence one should operate boldly

and rapidly rather than timidly and slowly. After replacing the cord with the patient in the knee-chest posture, she should be put on the side to which the child's back is turned.

As soon as reposition has been effected, the fetal heart becomes slower, but rapidly returns to normal after pressure is relieved. Until labor has progressed beyond the possibility of recurrence, the fetal heart sounds should be listened to at frequent intervals.

In rare instances the cord may prolapse in head presentations while the amniotic sac is still unruptured and the os undilated. Posture alone will oftentimes correct the displacement; but if it does not, it must be treated as above described. The sac need not necessarily be ruptured in order to do it.

In cross-births and breech-births complicated with prolapse the metreurynter becomes serviceable. Before placing it in position, the cord must first be pushed high up and, when possible, looped over an extremity; otherwise it may become compressed between the metreurynter and the advancing part.

## CHAPTER VII

### VERSION

Version implies a change of position, not merely a change of presentation. To convert a head presentation into one of the breech, or a cross-birth into one of the head, is version; but to alter a breech presentation by making it one of the foot, is not version, for the poles of the child remain unchanged.

There are two general indications for version: (1) as a measure of expediency in rapid delivery; and, (2) as a maneuver whereby the relations of the fetus to the pelvic inlet may be so adjusted as to make birth easier or, at least, possible.

An indication for rapid delivery arises, for example, in a mild type of placenta previa when the head of the child lies so high that forceps can not be applied. By turning the fetus, a foot may be grasped and the child extracted. The cross-birth, the occipito-posterior position, and the brow-presentation are other conditions which may deliberately be so turned that birth, instead of being dangerous or impossible, becomes comparatively easy and safe.

Version may be undertaken to bring down the head (cephalic version) or, to bring down the breech (podalic version); and there are three ways of doing it: (1) by external manipulations alone, (2) by internal alone, and (3) by a combination of the two.

**External Version by the Head.**—The conversion of a transverse or a breech presentation into one of the head is undertaken through the abdominal wall. The operation is practically dangerless for either the mother or the child. By it one is able to secure a vertex presentation in place of some other and less favorable presentation. Besides, the vertex once fixed, birth goes on more advantageously than it otherwise can.

An exact diagnosis having previously been made, the patient is placed lengthwise on the bed, and the operator seats himself beside her. One hand is laid on the head of the fetus, the other

on the breech, and pressure is made in opposite directions, just as one turns the steering wheel of an automobile, if such a comparison be permissible. The force applied may be continuous or intermittent, so long as each gain is held. The turning is continued until the head occupies the middle line over the pelvic inlet. (Fig. 46.) With sensitive women or with those who have

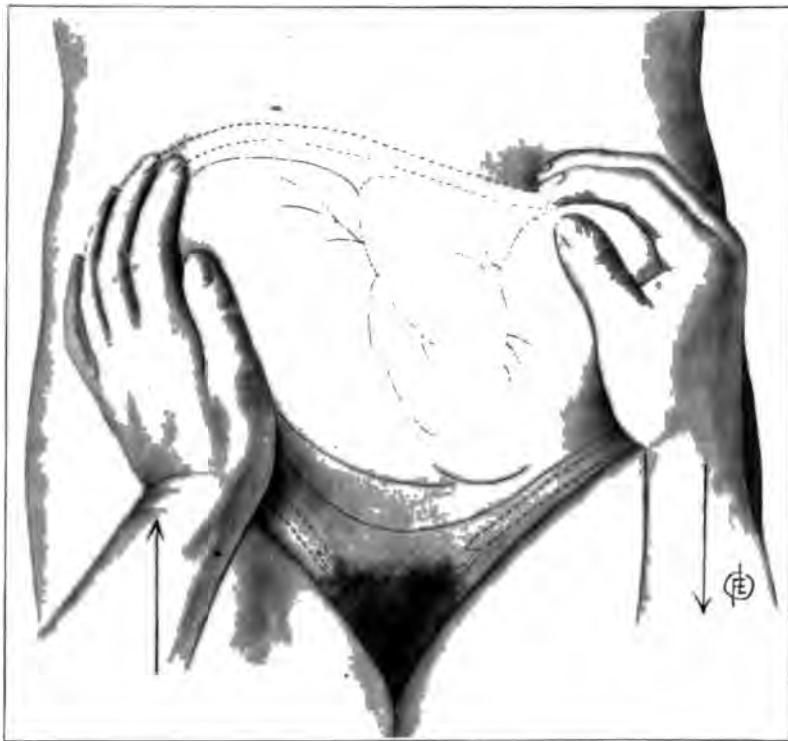


Fig. 46.—External version.

thick, resisting abdominal walls, it is better to operate under anesthesia. Even then it is not always possible to effect the change. If the amount of amniotic fluid is greatly diminished, attempts at version only distort the uterus and its contents; and on the other hand, an excessive amount of fluid prevents one from grasping the child securely. A very large child and a very small child present the same troubles; they make the

manipulations difficult. Obviously, the fetus must be movable or it can not be turned.

After the direction of the poles of the child has been reversed, the object is to keep the head fixed. This is favored by rupturing the sac, thereby allowing the uterus to contract about the child. The rupture should be done in a way that will allow the fluid to escape gradually. If it comes with a gush there is danger of the cord being carried out with the sudden flow.

While the mouth of the uterus is still closed, the sac should not be ruptured, but the head should be held in position by mechanical means, which is done by placing pads at the sides of the head and holding them there with a bandage tightly applied about the mother's body. Afterward the patient is put on her back in bed, and kept quiet.

A case comes to mind of a woman who on four occasions had a transverse presentation of the child. Internal version was performed twice, and the combined version once with fatal results to the child each time. In the last month of the fourth pregnancy, twenty days before labor, the child was turned by external manipulation, the head fixed by bandaging, and the patient kept in bed. Spontaneous birth and a live child was the outcome.

The situation which most frequently makes external version by the head feasible is a transverse presentation of the second twin in a dual pregnancy, since therein are fulfilled all the preliminary conditions enumerated.

**External Version by the Breech.**—Turning the child from some other presentation to one of the breech is seldom done, and rarely by external manipulation alone; not because the operation is difficult to do, but because it is not often considered expedient. The same principles apply to its performance as were enumerated under external version by the head. Whether a transverse presentation shall be converted into one of the head or into one of the breech depends largely on which pole of the fetus lies nearer the pelvic inlet. Another reason for changing a vertex or a transverse presentation into one of the breech is, that it offers the operator a better hold for delivery. For example, in placenta previa, before the sac has ruptured, external

version by the breech may be effected, and later a foot grasped without doing the parts great violence.

**Internal Version.**—Although the internal hand has the more difficult part of the operation to perform, the external hand coordinates with it in a very effectual way by offering support and counterpressure to the fetal ovoid, so that internal version is really a bimanual procedure.

Internal version is indicated in the following conditions: (1) when the head of the child will not engage, (2) in transverse presentations, and (3) in certain presentations of the head.

In case the head of the child will not engage in the presence of active labor, assuming that no marked inequality exists between the child and the mother, podalic version has advantages. Compared with the high forceps operation it is the safer of the two. Its advantages will be referred to later.

Cross-births left to nature are accompanied by serious consequences, to both mother and child. Either the fetus must be abnormally small or the mother abnormally large for spontaneous birth to occur. For this reason the baby must be turned, and, as stated above, version into a vertex is the freest from danger. But in the majority of cases this is not readily accomplished, since the preliminary conditions that afford sufficient mobility are wanting. The introduced hand can do little with the head, but the leg and foot provide excellent members upon which to make traction. If one sees the patient early enough, external version would be the operation of choice; but the physician is often brought to the patient after labor has been in progress for hours, and the amniotic sac long since ruptured.

Arrest of the head at the isthmus of the pelvis, as in brow and occipitoposterior positions, may be successfully treated by version. Even when the vertex presents in an anterior position, it is sometimes desirable to reverse the poles of the fetus, as noted in prolapse of the cord, placenta previa, and moderate degrees of pelvic contraction.

The preliminary conditions upon which the success of internal version depends are, (1) the mouth of the uterus must be fully dilated; (2) the advancing head of the child must not be fixed in the pelvis; (3) the child must be movable; and (4) absolute contractions of the pelvis must not be present.

The cervix must be fully dilated for the reason that the entire hand of the operator has to be passed into the uterus. The obstetrician should make sure of this, for he can easily be misled into believing the whole cervix is open when really it is only the external os that is dilated. One should satisfy himself on this point by sweeping the fingers around the head of the child as it lies within the uterus; nor should one forget that abnormal irritation of the uterus through prolonged and ineffectual attempts at delivery can cause a partial closure of the internal os, sometimes spoken of as a stricture, which will offer for the time being an insurmountable bar to delivery.

In order to get hold of the foot, the child's head must be free in the pelvis. If it is fast, the operator's hand can not be passed beyond it. However, one is justified in making use of the relaxing effect of narcosis before abandoning the attempt. The body of the child, too, must be movable. If the lower segment of the uterus is much thinned out, there is danger of rupturing it with the hand; and this danger is greatly increased by the added strain of version, especially if the uterus is in a tonic state of contraction. Such a condition makes the operation practically impossible.

Failure to turn, calls for other procedures, such as the use of forceps, pubiotomy, or even craniotomy; and to attempt version in the presence of absolute pelvic contraction would be worse than useless. Such cases demand cesarean section.

Edema, scar tissue, neoplasms, and congenital malformations play the same part externally that the bony parts play internally, and by their presence contraindicate version.

**The Technic of Internal Version.**—Narcosis is of special service in the performance of internal version. To pass the hand and arm into the birth canal excites uterine activity, which increases in intensity as the cavity becomes penetrated. Narcosis does away with much of this reflex excitability. Version may be undertaken in favorable cases without it if, for any good reason, anesthesia is contraindicated. But, since one never can tell exactly how difficult a given case is going to be, it is wise to



follow the general rule of putting the patient to sleep before beginning the operation.

Lying crosswise on the bed, or, better still, lying on the operating table, the knees separated and supported, is the preferable position for internal version. In this posture disinfection is more readily applied and more surely maintained. There may be conditions, as in marked pendulosity of the abdomen, when it will be found helpful to turn the patient on her side. If it is desired to change from the dorsal to the lateral position in the midst of the operation, the leg of the patient may be carried over the head of the operator without the necessity of withdrawing his hand.

The operator kneels in front of the bed, and the appropriate hand is passed into the cavity of the uterus. Since the foot of the child is the object sought, that hand is employed which will more readily reach and grasp it. If the feet of the child lie at the mother's left side, the right hand of the operator is introduced; if to the mother's right, his left hand is used. Should the mistake of passing the wrong hand be made, it is not serious, and need not be corrected unless it is found impossible to effect version with the one already in the uterus.

In passing the hand into the birth tract, the ends of the fingers are brought together and introduced slowly and cautiously while with the other hand the labia are separated. (Figs. 47 and 48.) If the sac is already ruptured the fluid may furnish sufficient lubrication; otherwise the gloved hand should be made slippery with lysol solution. The operation seldom requires haste in its performance. Even in deep narcosis the entering hand will stimulate contractions of the uterine and abdominal muscles, which must be overcome gradually and between pains; the sac is ruptured, the advancing part pressed to one side, and the hand pushed on into the cavity of the amnion. As soon as the internal hand has passed the vulva the other is placed on the abdomen, the spread fingers spanning the fundus of the uterus. By supporting the organ in this way the danger of loosening the uterovaginal attachment with the internal hand is greatly lessened. (Figs. 49 and 50.)






Fig. 47.—Gloved hand shaped for introduction into the birth canal.



Fig. 48.—Version in the second position of the vertex. First step. The fingers and thumb of the right hand are brought together in the shape of a cone; the fingers of the other hand hold the labia apart.

The next maneuver, that of getting hold of a foot, is sometimes troublesome because of the difficulty in determining the true relations. The face is easily made out by touch, but not the feet, for they occupy a much more contracted space. In the vertex position the feet commonly lie above in the fundus of the uterus, although occasionally they may be found near the head.



Fig. 49.—Version in the second position of the vertex. Second step. Searching for the feet with the right hand, the left hand pressing upon the fundus externally.

In the transverse presentations, dorsum posterior, they generally lie crossed on the abdomen of the child in front, but they may become extended.

In order to reach the feet the hand is slipped along the border of the thorax and to the thigh and leg. Or one may, if the diagnosis of position has been carefully made, proceed by the shorter

route, going directly to the feet over the face and belly of the fetus. One method is known as the indirect or French, the other as the direct or German. Each has its advantages (Fig. 51).



Fig. 50.—Version in the second position of the vertex. The entire right hand is passed into the uterus to the fundus in search of a foot, the outer hand making pressure over the region of the child's buttock.

By the French method the hand is carried to the foot with greater certainty, obviating the mistake of grasping a hand instead of a





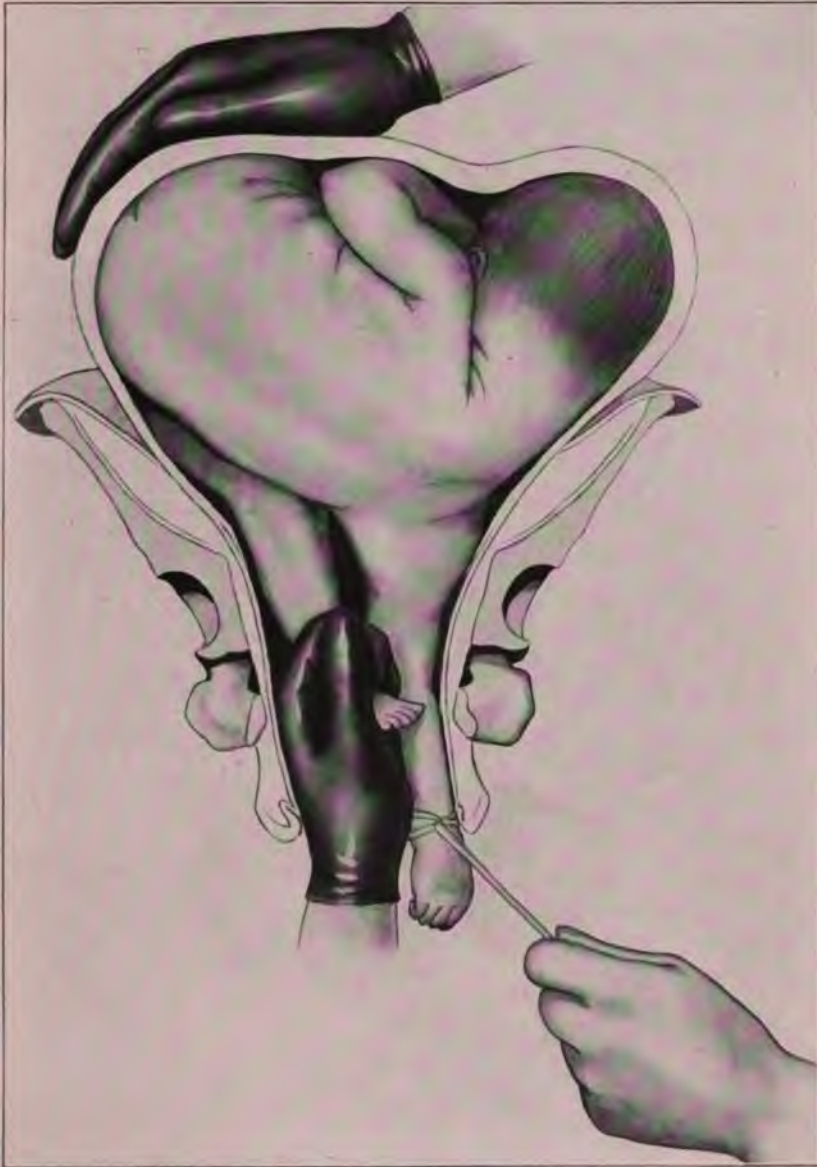


Fig. 52.—Version in the first dorsoanterior transverse position: the arm prolapsed. The introduced (left) hand has grasped and drawn down the lower foot while the external hand presses on the child's buttock. An assistant makes traction by means of a sling applied to the child's wrist.

drawn upon, favor the preservation of or the rotation to an anterior position of the occiput.

To secure this advantage the anterior foot in all vertex presentations is chosen. In transverse presentations, with the back of



Fig. 53.—Version in the second dorsoposterior transverse position. The internal (right) hand grasps the upper foot; the external hand is pressed upon the child's buttocks.

the child lying toward the mother's abdomen, it is the posterior foot; with the back toward the mother's back, it is the anterior foot. (Figs. 51, 52 and 53.) One is sometimes content to take the first one that can be reached, whether it be the more favorable or not. An extremity should never be pulled down, however, before

fully determining which member it is. Presuming it to be a foot, one proceeds to prove it by its characteristic landmarks. To tell an arm from a leg is not always easy, but the foot ought to be readily identified by its short toes, the ankle, and the heel.

All activity should cease during a contraction.

When reached, the foot is grasped (Fig. 53) between the operator's second and third fingers and held fast. It may be



Fig. 54.—Version in the second position of the vertex. Third step. A foot is grasped and drawn down to the introitus, the external hand pushing upward on the child's head.

pulled down into the vagina without changing the position of the child, whose actual turning does not begin until this point is reached.

As the operator continues to draw slowly and carefully on the extremity with the one hand, he presses upward with the other. (Figs. 54 and 55.)



Not until the knee is visible at the vulva is one sure that version has been accomplished. (Fig. 56.)

**Combined Version.**—The combined version differs from internal version in that the outer, instead of the inner, hand performs



Fig. 55.—Version in the second position of the vertex. Inner view of Fig. 54.

the more important part. Without their cooperation, however, turning could not be effected; and since only two fingers are used in the uterus, the operation is employed only in the earlier stages of labor, before dilation has taken place.

The indications, briefly stated, are (1) in placenta previa partialis; (2) in transverse presentations with premature rupture of the amnion; (3) in prolapse of the umbilical cord in vertex presentations, the os uteri undilated; and (4) in dangers threatening the life of the mother in the first stage of labor.



Fig. 56.—Version in the second transverse position. Fourth step. The foot and the leg as high as the knee have been brought outside the vulva. The head is now in the fundus, and version is complete.

The usual disinfection of the operator and patient is observed. Few instruments are needed. A tenaculum forceps, a dressing forceps or other instrument suitable for rupturing the sac, a placental forceps with which, under certain circumstances, the foot may be

grasped through the narrow cervix, and a version sling, are sufficient.

Narcosis is desirable, though occasions may arise, as in severe anemia, when it may have to be omitted.

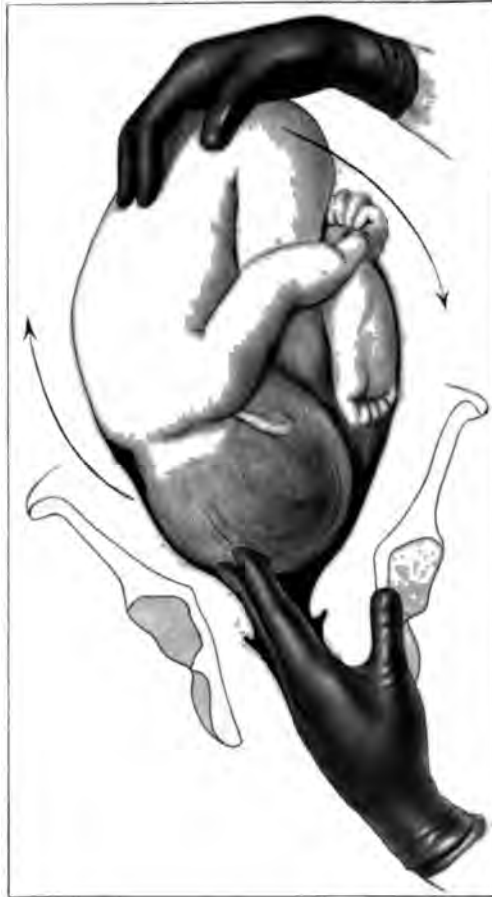


Fig. 57.—Version through combined internal and external manipulation. (After Braxton-Hicks-Bumm.)

The hand of the operator corresponding to the side of the mother in which the child's feet lie, is passed into the vagina. The sac is ruptured either with the fingers or with an instrument. The presenting part is pushed to one side, and the fingers

carried as high as they will go. With the external hand on the abdomen, the feet are pressed downward, the purpose being to bring them within reach of the other hand. (Fig. 58.) As soon as a foot is felt and unmistakably diagnosed as such, it is secured



Fig. 58.—Combined version in the second position of the vertex; placenta previa marginalis. The whole hand is introduced into the vagina, and the first two fingers passed through the partially opened os. With the other hand applied to the mother's abdomen, pressure is made on the child's back and buttocks, the aim being to cause a foot to come down within reach of the two fingers pressed up from below.

and brought down as in internal version just described. When far enough down, a sling may be applied to the ankle, and the foot held while the head of the child is pushed toward the fundus.

### THE DIFFICULTIES ENCOUNTERED IN PERFORMING VERSION

In describing internal and combined version, noncomplicated cases have been borne in mind. There are, however, many difficulties to be encountered. The very first step of the operation, that of passing the hand into the vagina, is sometimes very hard to take, especially in an elderly primipara. Also the canal may be obstructed by the prolapse of an arm, which is particularly apt to occur in cross-births. An attempt to restore it would be a mistake, for the arm readily follows the head as turning takes place. And again, the condition of the uterus itself may be a complication. Undertaken before the sac has ruptured, or shortly thereafter, version is not hampered by the narrowed space within the cavity; one finds ample room between the walls of the uterus and the child's body to operate. And even if the liquor amnii has drained away, and the walls lie contracted about the child, the reduced size offers no serious difficulty, if labor has not begun. But the situation is quite different if it has; for the organ will not then relax, the hand becomes cramped, the child fixed, and further manipulations do more harm than good. Unless one is able to do within a reasonably short time what he starts out to do, he had better not attempt the operation at all; for version is one of the procedures that prolonged effort only makes increasingly difficult.

And not only is the uterus wrought up by manipulation, but it is stimulated even to greater activity by the administration of ergot and pituitary extract indiscriminately given. When thus excited, the best thing for the operator to do is to induce rest. Hot packs, the prolonged hot bath, and time help to relieve the rigidity; but the remedy *par excellence* in such conditions is morphine with atropine given hypodermatically. Version can usually be performed after a few hours of such treatment.

If, upon full dilatation of the cervix, the fetus does not advance, the effect of labor is to cause a thinning out of the lower segment of the uterus, the walls becoming powerless from overdistention and in imminent danger of rupturing. To attempt version under such circumstances would be to court disaster. (See Rupture of the Uterus, page 308.)

In undertaking a difficult version, then, one should consider the dangers accompanying it, and proceed accordingly. The hand is passed slowly and carefully along the side of the advancing part, yet more cautiously between the child and the wall of the uterus. The contracting ring of Bandl is to be passed only in the interval of a pain. Beyond this segment, movement is freer, and the benumbed hand may be relaxed and rested.

The foot, once secured, should be brought slowly through the stretched canal. Sometimes the constriction is so marked that the grasped foot can not be brought through with the hand closed, and the movement must be managed with the thumb pressing the foot against the palm, or with it held between two extended fingers.

The acme of danger is reached when the child turns, when it lies for a brief moment wholly crosswise in the canal.

If the simple procedure of pushing up on the head with the one hand while drawing down on the foot with the other, does not succeed, one may try the version sling. With this device the extremity can be held more securely than is possible with the fingers.

Instead of attempting externally to dislodge the head while pulling on the foot, it is sometimes more effective to make the upward pressure with the hand in the vagina, a maneuver known as the countermanipulation of Siegemundin (Fig. 59).

A maneuver, suggested by Broese, of laying the hand flatwise along the side of the head, between it and the uterine wall, has certain advantages. The palm acts as a grooved director, while with the heel of the hand intermittent or continuous pressure may be made in an upward direction on the head. Simultaneous traction on the foot is continued as in the other method.

But not all the difficulties of version are due to conditions of the mother; the fetus, as well, may present complications. The posture it assumes may be so confusing that one is puzzled to locate the feet, which appear to have wandered from the place where they ought to be. Occasionally the free leg becomes crossed over the one pulled down, necessitating its dislodgment before version can be effected. (Fig. 60.) Very large children, also, can complicate the operation by their unmanageable bulk.

Even so simple an act as rupturing the amnion, is not always



Fig. 59.- Version in the first position of the vertex, showing the use of the sling. Version in this case is made difficult by the contraction ring of Bandl. With a sling fastened to both feet they are held securely, while with the other hand, which is within the uterus, pressure in an upward direction is made on the child's head. The maneuver is known as the double manipulation of Justine Siegemundin.

easy, especially when performed during combined version. The membrane may lie so loosely in the cervical opening that the fingers can not get hold of it, making instrumental perforation necessary.

When the foot lies extended in the narrow canal of the cervix, making it impossible to get hold of it with the fingers, one may venture to grasp it with placental forceps.



Fig. 60.—A complicating situation in a transverse position after a fruitless attempt to turn. Both arms and one foot are presenting; the other foot is held in the flexure of the child's neck.

## PROGNOSIS

The prognosis in external version is good, hardly less favorable than in spontaneous birth. In the other forms, internal and combined, the dangers are increased for both mother and child.

### Dangers to the Mother

**Infection.**—Although the hand does not come in contact with the endometrium, especially its placental surface, there are likely to occur abrasions and lacerations, even though they be slight,



which present portals of entrance for infection. The danger is somewhat less in combined version, but even here its possibility is to be borne in mind, since the pulled-down leg occludes the cervix and retains within the cavity any pathogenic germs which may have been introduced by the fingers.

**Lacerations and Other Injuries.**—If the vulva and vagina are small and contracted, one will be likely to cause injury while introducing the hand and arm. To avoid this, the introitus is sometimes purposely incised, the aim being to secure a clean-cut wound rather than an irregular tear. The tissues may also be cautiously stretched with the colpeurynter preliminary to passing the hand, since its forcible introduction may seriously injure the uterovaginal support, particularly if no counterpressure is made on the fundus. Indeed, one of the worst accidents that can happen, rupture of the uterus, may be inflicted in this way. Such a rupture may be produced, or may be made much worse in completing the version after a foot has been drawn down. The characteristic sign of such an injury manifests itself by the sudden giving way of the resistance. There is a marked relaxation to be noted both by the external and internal hand; the spherical form of the uterus becomes flatter and more irregular; and the version, which seemed impossible a moment before, is now easily effected. The consequences are very serious, the mother nearly always dying.

### **Dangers to the Child**

As to the child, many fatalities accompany the operation; but it is not always fair to charge them to the turning alone, since extraction, so frequently to follow, is oftentimes more serious than the version itself. The principal danger is from disturbed fetal circulation. The operator in his search for the foot may inadvertently compress the umbilical cord, or, perhaps, detach a portion of the placenta, either of which would act injuriously to the child. The manipulation itself also tends prematurely to stimulate respiratory efforts. And while it is true that the sooner delivery is effected after version has been accomplished, the safer it will be for the child, one is often compelled to await further dilatation of the cervix before undertaking it. If the cervix

is only partially dilated and extraction is impossible, the development of alarming symptoms puts one in a dilemma, for version, after all, is but one step in the operation of delivery; the most trying part of the ordeal is yet to follow.

The following is an analysis of 500 versions, 42 of which were external, 123 combined, and 335 internal. Only 8 per cent of the whole number were first births.

The 42 external versions were made to relieve a transverse presentation, 39 of which ended in spontaneous birth. Of the other three, one was aided by extraction, the umbilical cord having prolapsed; another, in an occipitoposterior position, was turned and extracted; and the other was a breech, converted into a head and delivered with forceps. All the mothers lived; 3 of the children were born dead.

The 123 combined versions were performed upon the following indications:

Placenta previa	98 times
Infection	11 times
Eclampsia	7 times
Premature detachment of the normally placed placenta	2 times
Heart failure	2 times
Pneumonia	1 time
Transverse position	1 time
Asphyxia	1 time

Out of this number 9 mothers and 90 per cent of the children died.

Internal version was done for:

Transverse or oblique position	135 times
Prolapsed cord	61 times
Asphyxia of the child	40 times
Contracted pelvis	25 times
Occipitoposterior position	18 times
Fever	16 times
Eclampsia	14 times
Brow presentation	6 times
Marked contraction of Bandl's ring	4 times
Prolapsed arm in cross-birth	3 times
Premature detachment of the placenta (twice with twins)	3 times

## THE SURGICAL PROCEDURES

Face position in contracted pelvis	1 time
Face position, arm prolapsed	1 time
Vitium cordis	1 time
Diabetic coma	1 time

Of the 6 maternal deaths, 4 were from eclampsia, 1 from infection (previously existing), and 1 from diabetic coma. Twenty-two per cent of the children were born dead. (*Taken from the reports of the Koenigsberg Clinic.*)

## CHAPTER VIII

### BREECH-BIRTH

Positions of the breech, like positions of the vertex are longitudinal, and respond much the same to the natural forces of labor. Indeed, the breech position, under some circumstances, has its advantages over the vertex, and not infrequently is it secured designedly in order to serve the best interests of both mother and child.

If the presentation is diagnosed during pregnancy, in most instances it can be converted into a vertex by external version, if this is desired. If it is discovered only after labor has begun, the patient should be directed to conduct herself in a way most favorable to the preservation of the amnion, since its premature rupture delays dilatation and favors prolapse of the cord. For fear of causing such an accident, one should make all necessary examinations with great precaution.

A very important preliminary condition, one on which the safety of such a birth depends, is full and complete dilatation of the cervix. When the breech reaches the outlet of the pelvis, one may be assured that this condition has been fulfilled, and no further proof is necessary; but in other cases, especially in foot presentations, it is not safe to assume that the cervix is dilated, for it may not be. In order to make sure, the whole hand should be passed into the canal far enough to palpate the internal os; but this is generally too much of an ordeal for a patient to undergo without first being anesthetized.

A further and extremely important condition upon which success depends is the size of the pelvis; it must be large enough to give passage to the birth. If contracted, other procedures than extraction would be indicated. (See Indications for Cesarean Section, page 243.)

**TECHNIC OF EXTRACTION**

The patient is placed on the bed crosswise or on an operating table, and disinfected. In easy extraction narcosis is not required. In fact it may be a disadvantage, in that it interferes with the voluntary efforts of the patient to deliver herself; but since the



Fig. 61.—Extraction by traction on the foot. First step. The leg below the knee is grasped with both hands, the thumbs lying parallel on the calf. Traction is made downward.

extraction oftentimes follows upon version, the patient having already been narcotized for that purpose, her help can not be relied upon to any great extent.

The process of extraction should resemble spontaneous birth as closely as possible, especially with regard to maintaining the

normal posture of the child and the preservation of the normal mechanism. The nearer we imitate the evolution of nature, the better will be the result; and no result is counted worthy that does not save life. Expeditious extraction, for example, might



Fig. 62.—Extraction. Second step. The thigh is grasped with both hands, the thumbs lying on the flexor muscles. Traction is made downward, followed by a rotation of the hip forward.

save the baby's life, but bring with it a severe laceration of the mother's tissues; yet this would be counted far better than to lose the baby in an attempt to conserve the structures of the



mother. If one or the other must result, the child, within certain limitations, should receive the first consideration.

**Extraction of Foot Positions, One Foot Presenting.**—While the foot is still within the vagina, it is grasped around the ankle with the right hand in such a way that the index and middle fingers hook over the maleoli, their palmar surfaces resting on the



Fig. 63.—Extraction. Third step. Traction in an upward direction brings the anterior hip against the symphysis, and permits the posterior hip to rotate over the perineum.

flexed surface of the foot. Strong traction is made downward, the toes pointing toward the mother's back, the flexed surfaces of the legs lying to the front under the pubic arch. After the foot is born, it is grasped by both hands, the thumbs lying parallel on the calf of the leg, the fingers over the instep (Fig. 61). Traction is continued downward. When delivered up to the knee, the leg is held with the thumb lying on the flexed surface, the fingers

clasped about the knee (Fig. 62). The line of traction is not changed until the anterior thigh passes under the symphysis, when it is elevated (Fig. 63). As soon as the breech is born, both thumbs are laid along the back of the sacrum. If it be the right buttock that is born first, the right index finger is hooked over



Fig. 64.—Extraction. Fourth step. The thumbs are placed over the sacrum, the right hand grasps the anterior thigh, the index finger of the left hand is hooked into the groin of the other side. Traction is made downward.

the crest of the ilium, and the other three fingers laid about the thigh. The index finger of the left hand is pushed up into the flexure of the left groin, the other fingers remaining closed in the palm of the hand (Fig. 64). Obtaining a secure hold in this way



the breech is drawn in a downward direction until the point of the scapula appears under the symphysis (Fig. 65).



Fig. 65.—Extraction. Fifth step. Traction is made sharply downward until the anterior shoulder passes the superior strait and the scapula can be seen.

When the point of the scapula comes into view, the sixth step of the operation begins, namely, the freeing of the arms.



Fig. 66.—Extraction. Sixth step. Freeing the anterior arm from under the symphysis. The shoulder lies at the brim of the pelvis; the arm is brought down by the finger hooked in the flexure of the elbow.

Normally the shoulders occupy an anteroposterior position at the pelvic outlet, one shoulder back of the symphysis and the other in the hollow of the sacrum, the arms lying crossed upon the breast. The freeing of the posterior arm, owing to its accessibility, is much easier of accomplishment than the anterior. To do it the child is grasped about the ankles with one hand, and the body



Fig. 67.—Extraction. Seventh step. Freeing the second arm from the hollow of the sacrum. Traction on the child's body is made upward and to one side; two fingers of the side corresponding to that of the child are passed over the shoulder and the arm stripped downward and outward as shown in Fig. 68.

strongly elevated and moderately flexed toward the mother's abdomen. The index and middle fingers of the operator's other hand are passed over the child's shoulder along the upper arm to the elbow and on down, sweeping the arm forward over the breast and abdomen. In order to free the second arm, which now

lies under the symphysis, it is first necessary to rotate it into the hollow of the sacrum, after which it is brought down as was the first. (Figs. 66-69.)

Another method, somewhat simpler than the above, is to pull the anterior arm down first. This is done by making strong traction on the child's body in a downward, instead of in an upward,



Fig. 68.—Extraction. Freeing the second arm, as seen from the inside.

direction, until the upper arm comes into view, when it is easily freed anteriorly with the finger (Fig. 66). No rotation is necessary in order to get the posterior arm, for it already lies in the hollow of the sacrum and may be delivered as described in the first instance.

The next step in the operation of extraction is the delivery of

the after-coming head. The method of Veit-Smellie, or Mauriceau-Levret, as it sometimes is called, is considered the most satisfactory. A finger, first or second, is passed into the child's mouth as far back as the base of the tongue, and the chin drawn down onto the breast, the child lying astride the operator's arm. With the other hand the baby is securely grasped about the shoulders, the first and second fingers, fork-like, passing over the shoulder



Fig. 69.—Extraction. Freeing the posterior arm, viewed from within the pelvis.

and lying at the side of the neck (Figs. 70 and 71). Occasionally it is puzzling to find the mouth. Usually it is in the middle line of the pelvis or slightly to one side. To locate it, the index finger of the left hand is passed along the posterior vaginal wall until it comes to the chin, which is recognized by the angle of the jaw. Traction is made downward until the occipital pro-



tubercle presses under the symphysis; the body is then elevated, and the face rotated over the perineum.

It should also be remembered that in freeing the arm the head



Fig. 70.—Extraction. Eighth step. Delivery of the after-coming head by the Veit-Smellie method. The child's head is in the pelvis, and its body lies astride the operator's left arm. With two fingers of the operator's left hand in the child's mouth, and two fingers of his other hand hooked over its shoulders, traction is made in a downward direction until the occipital protuberance passes the symphysis, then in an upward curve, the face and brow rotating over the perineum.

rotates with the body. In more than half the cases the mouth will be found on the side opposite to which it was when the first arm was brought down. That hand is employed which most

readily reaches the mouth, the left in right positions, the right in left positions (Fig. 72). If the mouth is not found on the side it was thought to be on, the operator's hand is changed.

**Extraction in Foot Positions, Both Feet Presenting.**—When both feet present, they are grasped by a single hand in the following manner: The fingers are placed around the two ankles in such a way that the middle finger lies between and separates them, while the other two lie externally, the thumb and little



Fig. 71.—Veit-Smellie method of delivering the after-coming head as seen from within the birth canal.

finger coming together over the sole of the foot. After their delivery through the vulva, a foot is grasped in each hand, with the thumbs on the calf, and the fingers encircling the ankle (Fig. 73). Delivery from this point on is the same as has been described above.

In making breech-extraction, two situations are to be considered; viz., where the breech lies above the brim, and where the breech lies below the brim.

If the breech lies above the brim, the presentation should be

converted into a footling. Two to four fingers are passed into the uterus and along the anterior surface of the child up to the knee. The leg is then flexed on the thigh so that the foot lies against the buttock, when it may be brought down and delivered in the usual way (Fig. 74). The procedure should not be undertaken except under narcosis. When the back of the child lies toward the mother's back, the manipulations are more difficult than when



Fig. 72.—Delivering the after-coming head (Veit-Smellie method) when it lies above the pelvic inlet. The mouth is turned to one side. Traction is made sharply downward.

it lies in the anterior position. Turning the patient on the side in which the child's feet are found makes it easier to reach them.

In the second situation, where the breech lies below the brim, the difficulties of extraction are considerably increased. With the breech of the child wedged into the excavation of the pelvis, the jack-knife posture makes it very awkward to apply traction by any means. The finger is always safe and available, but it can not always be



hooked into the angle of the groin; besides, even if it could, the finger lacks strength. Only in the easier cases, in which the soft parts offer little resistance, can extraction be managed in this way (Fig. 75).

To supplement the finger, or, rather, to take the place of the finger, instruments have been devised that hook into the groin or pass around it, upon which one may pull. The blunt hook



Fig. 73.—Extraction, both feet presenting. Each hand grasps a leg, the thumbs lying on the calves. Traction is made in a downward direction.

and extraction sling, are designed for this purpose. The sling, while less dangerous to the tissues of the child than the hook, is harder to apply. On the other hand, the hook is easily carried in and is fairly safe of adjustment, the danger from its use lying in the amount of force needed to draw the breech through

the soft parts. Irreparable harm may be done the child, especially to the hip joint, in the operation.

Bunge has invented a metal sling-carrier which can be passed into position like the ordinary blunt hook, and it is so constructed



Fig. 74.—Bringing down a foot in the breech position. The hand corresponding to the foot sought is introduced into the uterus. It is then passed along the thigh to the knee and on to the leg, the leg flexed and the foot drawn down.

that it can be removed or left in place while traction is made on the flexible sling with which it is armed. The instrument is really nothing more than a grooved director fashioned into the form of a hook, carrying a piece of rubber tubing of the proper

size (Fig. 76). With it the advantages of both hook and sling are to be obtained. Its introduction is not especially difficult. Held in the right hand, it is passed under guidance of the first and second fingers of the left hand into position about the child's groin. (Fig. 77.) The carrier may be left after the sling has been



Fig. 75.—Extraction completed with the finger in the groin after the breech has been brought down by some other means.

placed; or it may be removed, whichever suits the purpose best (Figs. 78 and 79).

The blunt hook of Smellie is another instrument designed to fit into the groin, and is much stronger and more dangerous than the Bunge carrier. It should not be used on the living child (Fig. 80).

A hook that gives the best results in living children is the breech hook of Küstner, which is made with a pelvic curve that

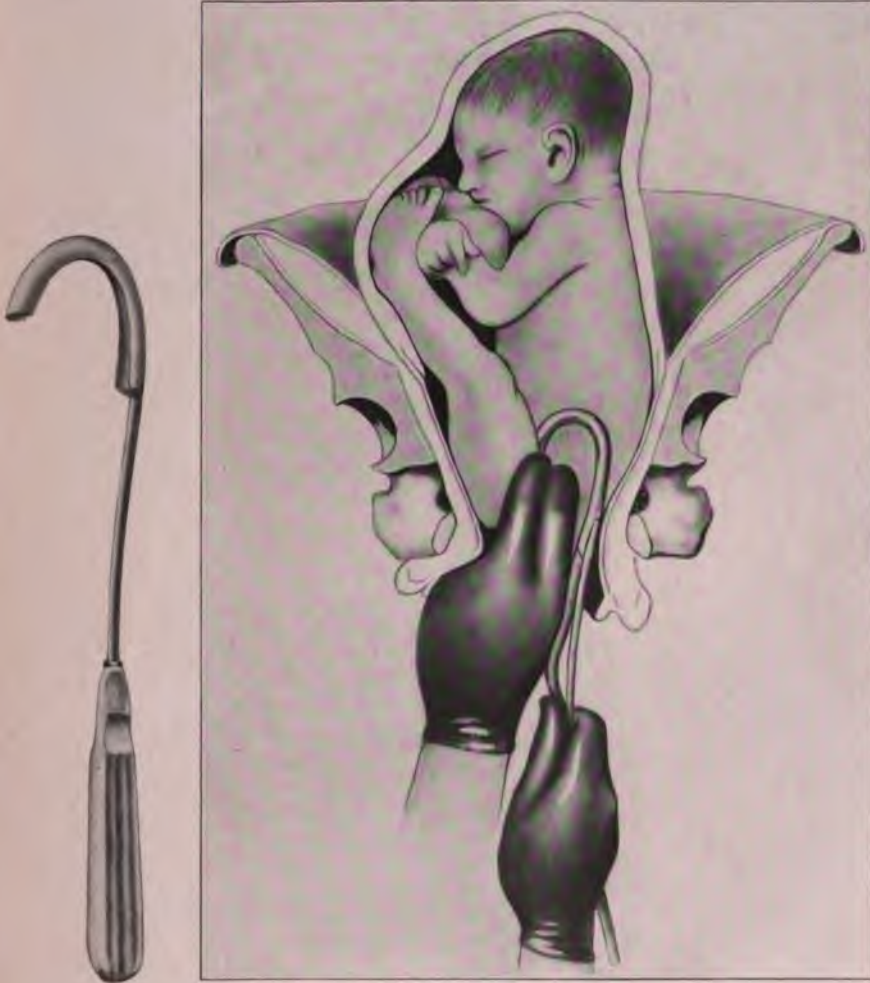


Fig. 76.—  
Bunge's sling  
carrier.

Fig. 77.—Passing the Bunge sling carrier about the thigh.

makes possible its application to the posterior groin (Fig. 81). The instrument is held with the right hand, and, under the guidance of the left, is introduced along the sacral curve to the



groin of the child (Fig. 82). Unless the introitus is relaxed, it is advisable to perform episiotomy before attempting to place the



Fig. 78.--The sling carrier in position.

hook in position. Traction is made downward until the anterior hip appears under the symphysis, when the direction should be upward, the posterior buttock rotating over the perineum.

The use of hooks, fortunately, is not often necessary. Either the breech remains so high above the brim that a foot can be



Fig. 79.—The sling carrier removed, and the sling in place ready for traction.

brought down, or so low that the groin can be reached with the finger. If one has reason to believe that a given breech-birth is

going to be difficult, it is wise, as a prophylactic measure, to bring down a foot before the breech becomes immobilized in the pelvis.

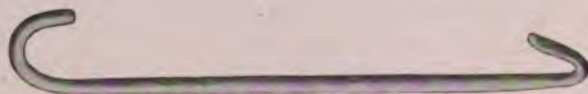


Fig. 80.—Smellie's blunt hook.



Fig. 81.—Küstner's breech hook.

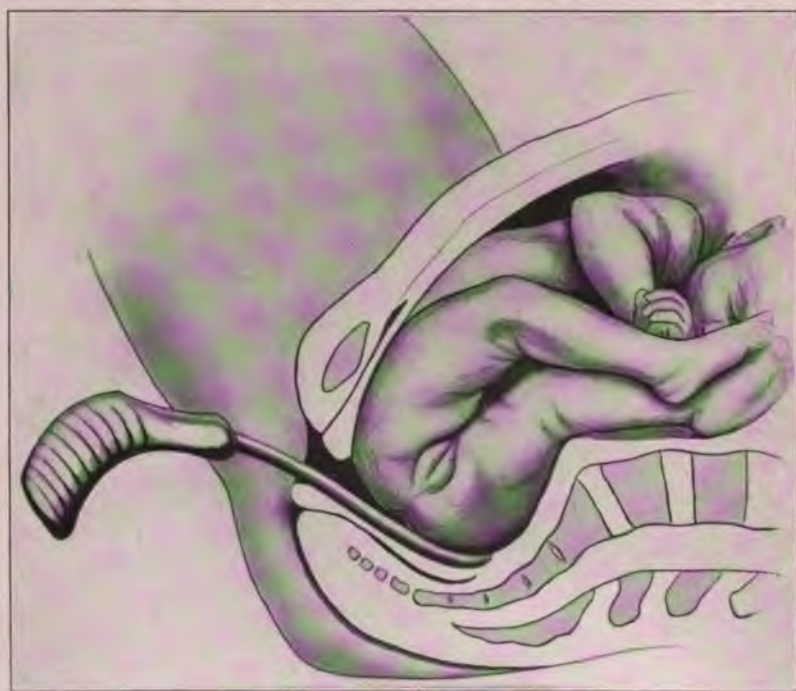


Fig. 82.—Extraction with the Küstner hook. (The foregoing figures illustrating the operations of version and extraction, are copied after Hammerschlag.)

(For the application of forceps in breech positions, see the succeeding chapter.)

### THE DIFFICULTIES ENCOUNTERED IN BIRTH BY THE BREECH

**In Extracting the Buttocks.**—When the breech reaches the inlet of the pelvis, which occurs about the time the knee appears at the vulva, progress may become arrested. There are two causes for this arrest. One is, that the breech undertakes to enter the pelvis with its intertrochanteric diameter directed anteroposteriorly; the other is, that, either from its falling down or its being pulled down, the posterior foot causes the anterior hip to override the symphysis. Both of these conditions are more likely to occur when the maternal pelvis is contracted.

Since the breech must enter the pelvis either transversely or obliquely, the proper treatment is to draw the anterior foot to one side, thus favoring the rotation of the back toward the mother's abdomen.

When, from overriding of the symphysis, progress becomes arrested, the anterior hip may be pulled under the arch by making traction sharply downward on the anterior foot.

**Freeing the Arms.**—If, instead of remaining flexed on the breast, the arms become extended, they must be brought down before the head can be born. This sometimes makes it necessary to introduce the whole hand into the canal. But only when the arms can not be reached with the fingers should this be done. Even then it is well to first incise the introital ring laterally. Such extension of the arms almost always occurs if the mother's pelvis is contracted; and continued traction only tends to increase the immobilization of the fetus. To avoid such a complication one should try to correct the displacement before drawing the breech too low; and before delivering to the angle of the scapula, the hand should be introduced and the arms freed. If the breech is already in a low position, with the arms extended, and it is found impossible to free them in this way, strong traction is made downward and backward, in order to bring the anterior shoulder within reach, when the arms can be released, as previously described. The operation requires considerable force, and, occasionally, is accompanied by a fracture of the child's arm.

In rotating the child, as must be done in order to bring the other





Fig. 83.—Posterior displacement of the arm, complicating the delivery of the after-coming head. Its release can be accomplished only by rotating the body of the child to the left. (Modified from Kerr.)

shoulder posteriorly, there is great danger of the arm being twisted into a position back of the neck. (Fig. 83.) To prevent this it is better either to free the anterior arm, as directed above, or, when in turning the shoulders, to always turn the anterior shoulder



Fig. 84.—Veit-Smellie method of delivering the head supplemented by external pressure on the head.

away from the face. Should the arm once become fixed behind the head, the following manipulations for its release are suggested: First, seek to free the arm after the usual method of pushing it over the head with the fingers; next, attempt by hooking a



dicated. After performing this, the Veit-Smellie method of delivery becomes comparatively easy.

The application of forceps to the after-coming head is a perfectly proper procedure, but it is generally undertaken too late. If other methods of delivery are employed, and without success, so much valuable time is lost thereby that delivery with the forceps becomes hopeless.

Unfortunately it sometimes happens that the chin rotates to the



Fig. 85.—Delivery of the after-coming head when the chin lies against the symphysis pubis. (Prague method.—Bumm.)

front, where it hooks onto the symphysis. To reach the mouth with the head lying in this position is practically impossible; and making traction on the child's body or pressure on its head externally only aggravates the conditions. The faulty engagement must first be corrected. With one hand grasping the occiput internally, the other applied to the chin externally, rotation into an oblique diameter is possible. The Prague method (Fig. 85) is to grasp the child by the shoulders with one hand while with the other the legs are swept over the mother's abdomen and



brought strongly to one side. The manipulation, however, is not without danger because of the severe torsion on the child's neck.

### THE INJURIES ACCOMPANYING EXTRACTION

**Injuries to the Mother.**—Lacerations of the soft parts may be of various sorts and degrees, particularly when the extraction is rapidly made. The operation frequently demands haste; one can not always await dilatation. Consequently, more or less injury to the cervix and perineum are to be expected in all breech extractions, especially in the primipara. Owing to the conical shape of the advancing part, there is little danger of lacerating the cervix until after the shoulders are born. If the head is then forced through the resisting cervix, either by pulling on the child's body from below or by pressing on the head from above, a severe laceration is likely to occur.

If, in attempting to deliver the head, the cervix is brought down to the vulva, one is confronted with the necessity of doing one of two things—giving the tissues time to stretch, or cutting the resisting structures. Generally speaking, the situation concerns the child more than the mother. The mother can well afford to suffer an injury if the life of the child is saved. Therefore, if it has been ascertained that only the external os remains to be dilated, there should be no hesitancy in cutting it with the scissors. On the other hand, if the resistance is due to the internal os, one dare not cut with such freedom. By making slow traction after the method of Veit-Smellie, it is generally possible to free the face of the child, leaving only the posterior hemisphere of the head to be born. In this way the child may survive for a considerable time, long enough to allow the cervix to dilate without laceration or the need of incision.

The gravity of a cervical laceration depends chiefly on the involvement of the uterine artery. When this vessel is torn there is an immediate hemorrhage following the birth of the child. The child's head itself is usually covered with blood. Should such an injury occur in hospital practice, the bleeding would be controlled immediately by repairing the laceration. In the home this is not always practicable; and, instead of suturing the parts, the hemorrhage may have to be controlled by packing.

Other portions of the birth canal as well as the cervix may be injured by extraction, especially in first labors. The structure most likely to suffer is the perineum, the injuries of which are treated by immediate repair.

**Injuries to the Child.**—A careful inspection of the child should be made after its extraction. The continuity of the tissues, especially of the bones and joints, should be determined; crepitation and dislocations should be sought for; pathologic mobility determined by observing the imperfect use by the child of an extremity; and, eventually, if there is any doubt, the examination should be supplemented by radiography. It may be remarked in this connection, though, that the x-ray does not satisfactorily show the lesion of a loosened epiphysis.

Injuries may occur to the lower extremities, to the body, to the upper extremities, and to the head.

Most of the injuries to the lower extremities come from making torsion instead of traction; an epiphysis may become loosened, a joint lacerated, or a thigh fractured thereby. The mechanical principle involved in delivering the upper arm is one of leverage, and as a consequence the trauma inflicted is more often that of fracture, the most frequent member to suffer being the humerus. In bringing down the arms it may be that the operator's fingers were not carried high enough; instead of hooking them into the flexure of the elbow, an effort was made to free the arm by exerting force too near the shoulder.

Another bone often broken is the clavicle. It may be fractured by direct pressure in the Veit-Smellie procedure, the fingers bearing too firmly upon it in making traction; or it may be fractured by indirect pressure when much force is used to bring down an arm.

Fractures of the forearm are of rare occurrence, and come from making too strong traction below the elbow. Both bones are more likely to be broken than a single one, though of the two the radius is in greater danger than the ulna.

The outcome of most fractures is good. A simple splint worn for a fortnight is generally sufficient to insure union. Fractures of the humerus and clavicle which can be made out by abnormal mobility, crepitation, and disturbed function, are best treated by

placing a pad in the axilla, and immobilizing the arm on the breast. A broken leg or thigh may be splinted to the opposite member. Epiphyseal injuries are less amenable to treatment. Their management is similar to the above, but the results are not so satisfactory. Occasionally the injury is followed by a luxation.

The location of a fracture is disclosed by the sensation of crepitation over the fracture point, by the displacement of the ends of the bones, and by the roentgen rays. Such an injury to the upper end of the humerus gives abnormal mobility resembling dislocation.

A condition resembling epiphyseal luxation is observed in serious injury to the nerves, caused through pressure of the fingers in the Veit-Smellie manipulation. The reaction of degeneration, disclosed through use of the galvanic current, will establish the paralysis later.

Some of the more unusual injuries of the body are rupture of the liver and dislocation of the vertebræ. Either would be fatal. Nor is it unheard of for the body of the child to be torn away from the head. (See Decapitation, page 228.)

Injuries to the head are, for the most part, the result of disproportion. Obviously, a large head dragged or pushed through a small pelvis is apt to do damage, not only to the maternal parts, but to the fetus, as well. Trauma of the scalp may produce only a hematoma, but sometimes the injury amounts to an open wound. The forces of nature alone seldom cause such injuries; they are more likely to be produced by too much pressure from the outside, as when an assistant pushes on the head from above the symphysis. The exertion of immoderate force in this way is capable of doing great damage. Under certain circumstances the cranial vessels may be ruptured, and serious hemorrhage into the meninges may follow. Likewise, it is possible to fracture the skull or to tear loose the fascia at the base of the occiput. The indentation of a parietal bone at the point where it passes over the promontory of the sacrum, the so-called "spoon-shaped" depression, is a fairly common injury in obstetrics (Fig. 86). If the bone is not fractured, it may spring out again of itself; otherwise the depression may persist, and, if the injury has not caused

an intracranial hemorrhage, the child may grow up with an inverted bump.

If, in following out the Veit-Smellie technic of delivering the after-coming head, the fingers are not carried well into the mouth, there is danger of fracturing the lower jaw.

Such injuries of the head as have been mentioned, except hematoma and abrasions of the scalp, may easily prove fatal. The expectant treatment offers some hope, and is sufficient in many cases. The spoon-shaped depression of the parietal bone may be corrected by drawing it out with an instrument fashioned like a corkscrew, caution being taken not to introduce the in-



Fig. 86.—Spoon-shaped depression in the parietal bone.

strument far enough to injure the meninges. The bone generally snaps out after a few moments of elevation.

### PROGNOSIS

For the mother, a breech-birth is not accompanied by very great danger. Only through interference and the application of



force is such a birth made disadvantageous to her. But, on the other hand, a breech-birth greatly increases the dangers for the child. Through possible asphyxia, and the forcible manipulations often made necessary, the prognosis becomes serious.

## CHAPTER IX

### FORCEPS OPERATIONS

The forceps is an instrument of two parts not unlike two spoons, made in complement and so formed that each half can be introduced separately, adjusted to the child's head, and locked. Thus affixed, traction may, within certain limitations, be applied without harm to the mother or child. Theoretically, the action of the forceps is one of traction; but, inasmuch as its hold on the child's head is secured by pressure, this will vary somewhat with the amount of force exerted in effecting delivery, and herein lies the chief danger in its use.

The pattern of forceps generally recommended is the Simpson or some modification of it (Fig. 89). Personally, I have become attached to the McLane instrument. With it I find that I can accomplish more, and injure the child less, than with any other forceps. The axis-traction bar of McClinton is a fairly good substitute for the Tarnier forceps, and is quickly applied (Fig. 90).

The ideal forceps is light in construction, and is made of hand-forged steel. A cheap, poorly made instrument is worse than useless; it is dangerous.

### INDICATIONS AND CONDITIONS

The forceps is indicated whenever it will relieve a situation that can not be relieved better, or at least as well, by some other measure. Its use will be discussed from this point of view.

Asphyxia of the child is, perhaps, the most frequent indication for the use of forceps. The symptoms are discharge of meconium, marked alteration in the fetal heart sounds, and an effort on the part of the child to breathe.

From the mother's standpoint prolonged labor without progress suggests the use of forceps. Sometimes when dilatation is

complete, the head well down on the pelvic floor, and the forces of labor spent, a woman will complete her delivery if she is directed to "bear down" while the accoucheur makes external pressure on the abdomen. The expedient failing, a small dose of pituitary extract should be given; then, and not until then, the forceps may be employed.

Birth may come to a standstill, and remain quiescent for hours. If no danger exists for either mother or child, one can well afford to try other expedients before resorting to forceps. Some-

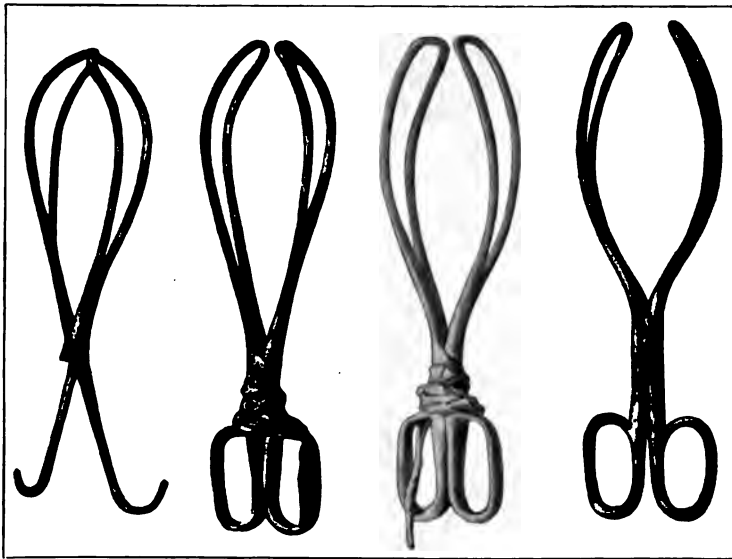


Fig. 87.—Chamberlen's forceps.

times a short rest under the influence of narcosis will be followed by renewed efforts. The narcosis also tends to dispel the patient's fear, and, instead of holding back, she will make more use of the voluntary muscles of the abdomen.

There is a limit, however, to the prolongation of fruitless labor. Continued indefinitely, changes of an undesirable character are likely to follow. Decomposition of the amniotic fluid through entrance of microorganisms, with consequent infection, has already been referred to. It is best, therefore, not to wait more than a few hours at most before bringing labor to a close. When

the head is low, the soft parts well stretched, and the position of the fetus normal, the operation of delivering with forceps is practically harmless.

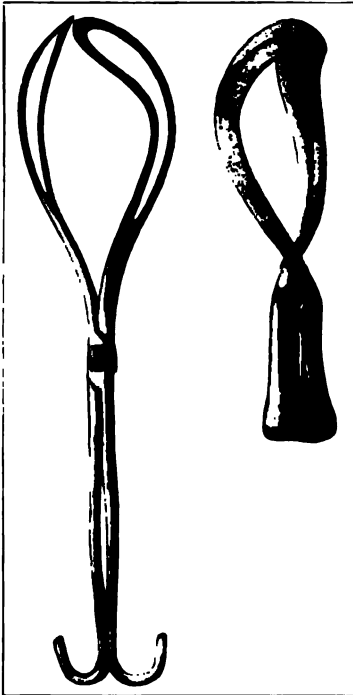


Fig. 88. Levret's long forceps, and Smellie's short forceps.



Fig. 89. Brown-Simpson forceps.

Four conditions must be fulfilled before attempting to deliver with forceps: (1) The amniotic sac must be ruptured; (2) the fetal head must not be above the average size and firmness; (3)

the mouth of the uterus must be fully dilated; and (4) the head must be engaged. To undertake the operation with one or the other of these conditions unsatisfied is a mistake; yet such mistakes are only too often made.

To apply forceps to the fetal head between the membranes and the uterine wall is not only a difficult thing to do, but the attempt would be accompanied by severe hemorrhage. So, before introducing the blades, one must positively know that the sac is ruptured. Sometimes this is not easily made out, especially when, in the absence of forewaters, the membranes lie

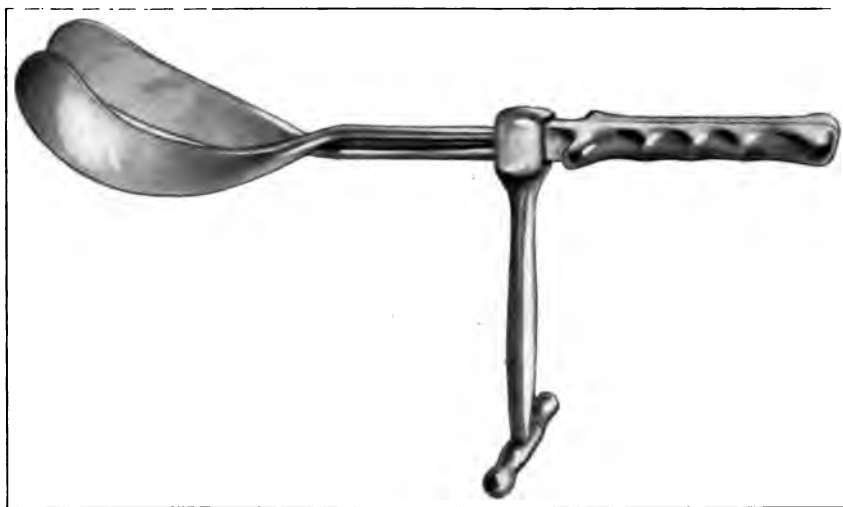


Fig. 90.—Tucker-McLane forceps with McClintock axis-traction bar applied.

close to the head. The child's hair can usually be felt if the sac has ruptured; yet even then it is sometimes puzzling with the gloved fingers to say that it is not covered with membrane. In doubtful cases one can tell whether the sac is ruptured by pressing the head upward. If ruptured, fluid will escape; if not, the sac becomes distended, as it overlies the head.

The cephalic curve of the forceps is designed to fit the average-sized head; but, while it is competent to seize and hold a head slightly smaller or larger, the instrument's range of utility is more limited than is commonly believed. In undertaking, for

example the extraction of a six-months fetus with it, the head can not be held. It is occasionally possible to deliver a hydrocephalic fetus with forceps, but the condition must be of light degree, and the head partially engaged and of moldable type.

The mouth of the uterus should be open. This rule admits of some variation in case the mother or child is in danger. Even then it may be wise to take time to complete the dilatation artificially, or to open the cervix by means of incisions, or, possibly, to perform vaginal cesarean section. When the head lies within the pelvis, and the os uteri is not only dilated, but retracted beyond reach of the examining finger, we have the most favorable situation for the proper use of forceps. The cervical canal may be obliterated without the external os having entirely disappeared, when, under such circumstances, it is permissible to apply forceps, counting on the head to complete the dilatation. In doing so it hardly need be added that traction should be made cautiously and slowly.

The head must be engaged. This is very important. Many failures and most serious consequences come from not adhering to the rule. One can be deceived into believing that the head has entered the pelvis when it has not. Even when the head is easily reached with the finger, or, possibly, is seen through the vulva, it may not have passed the superior strait. Especially is this true in cases of flat pelvis.

There are two methods of determining whether or not the head is engaged. One is the usual bimanual examination, by which it is estimated how much of the head lies above and how much below the inlet. The other method is by external manipulation alone. In either case one depends on the relation the head bears to the linea innominata; that is, whether it lies entirely above it, or has started to pass through it, or lies entirely below it.

If the head lies above the inlet, it can be grasped with the external hand above the symphysis while with the internal hand the obstetric conjugate can be spanned with the fingers. This would be a contraindication for forceps.

If a part of the head remains above the inlet while another part is felt in the excavation, or if the parietal eminences have passed beyond the linea innominata, so that the upper three

sacral vertebræ and two-thirds of the symphysis anteriorly can be palpated, the head may be said to be engaged. Here forceps is permissible.

One should bear in mind that the head is constantly undergoing changes of contour, and that nature is competent in most instances to mold it to fit the passages.



Fig. 91.—Application of the left blade of the forceps. The left blade is taken in the left hand as one would hold a pen. Two fingers of the right hand are introduced into the vagina, and applied with their palmar surface to the child's head. Between them and the head is passed the blade of the forceps. The thumb of the same hand is employed to support and urge it forward.

### METHOD OF PROCEDURE

The instruments required in the operation are the following: the forceps, a tissue forceps, artery clamps, a strong pair of scissors, a needle-holder, needles, suture material, a catheter, and a vaginal speculum.

In low forceps one may sometimes venture to deliver without changing the patient's position, it being very easy to apply forceps when the head is on the perineum; otherwise she is placed crosswise on the bed, the thighs flexed, and the knees separated. Thorough disinfection is important.

Narcosis is advised unless there is some contraindication. In low positions of the head it is not absolutely necessary, espe-

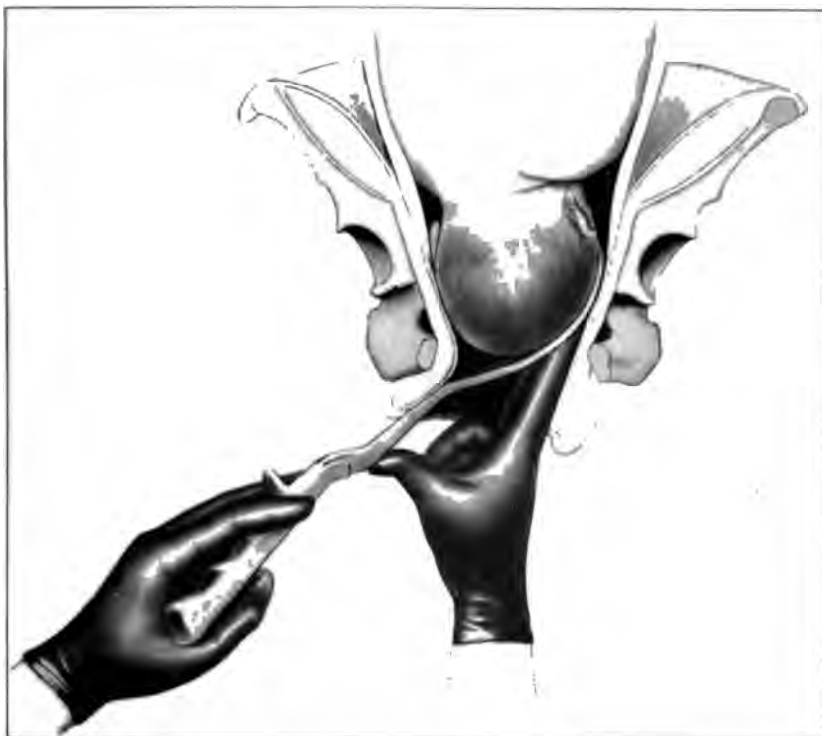


Fig. 92.—Another view of the same maneuver as illustrated in Fig. 91.

cially if the woman has borne children; and yet it is humane to allow it. If given at all, it should be deep enough to keep the patient quiet; for nothing is more annoying than to have her twist out of position during the operation.

A favorable case for delivery, it may be repeated, is one in which the head is found low in the pelvis, the os uteri fully dilated, and the advancing part adapted to the bony canal.



Upon completing the necessary preparations, the accoucheur seats himself before the patient, stands, if preferred, and proceeds as follows: The left blade of the forceps is taken in the left hand (Fig. 91) and introduced into the uterus along the left side; the right blade is then taken in the right hand and introduced into the uterus along the right side.



Fig. 93.—Application of the right blade of the forceps. Held like a pen, the right blade is taken in the right hand and the handle brought well over the right groin. Two fingers of the left hand are passed into the vagina, the nail side toward the dilated margin of the os uteri, the palmar surface applied to the child's scalp. The blade of the forceps is passed between the fingers and the head.

The manner of holding the blade is not very important; but I prefer to handle it like a spoon or a pen, instead of like a knife or a sword.

The left blade is taken in the left hand, as described; two fingers of the right hand are introduced into the vagina, keep-

ing close to the child's head; and the handle of the blade is carried over to the right groin of the mother with the tip of the blade directed into the left side of the vagina and cautiously slid along the palmar surface of the guiding fingers. As the blade passes upward and inward the handle is brought forward in a curve corresponding to the pelvic axis, falling to the middle line and resting on the perineum. While the index and middle



Fig. 94.—Both blades have been introduced, and lie unlocked, resting on the perineum.

fingers are guiding the end of the instrument within the canal the thumb on the outside aids materially as a fulcrum (Fig. 92).

The placing of the second or right blade (Fig. 93) is practically the same as that of the left, except that opposite hands are used in the various manipulations described. When in position, the second blade should fall on top of the first and lock easily (Fig. 94.) The handle of the left blade is taken in the left hand, the right in the right, with the thumb lying over the lock on the re-

spective sides (Fig. 95). Some effort is necessary to get the two halves adjusted and securely locked, but no undue force is permissible (Fig. 96).

There are no hard and fast rules as to how the forceps shall be held when making traction; no wrong nor right way. It will naturally be grasped to the best advantage, and will be held in every conceivable way before one is through with a difficult



Fig. 95.—Locking the blades.

delivery. On either side of the lock there is a projecting shoulder, over which the index and middle fingers are hooked advantageously. (Fig. 97.) The direction in which traction should be made depends on the position of the head. If it is low, the pull should be in line with the mother's body; if extending under the symphysis, it would be almost at a right angle. When the head is above the brim of the pelvis, traction is at first toward the



mother's back, then in line with her body, and so on, varying with the axial curve as the head moves along the canal.

To avoid compression of the child's head some instruments are provided with an adjustable screw at the end of the handle which keeps the blades separated to any desired degree. Most operators depend on the finger for this purpose, which is placed between the handles, while others use a piece of gauze or a

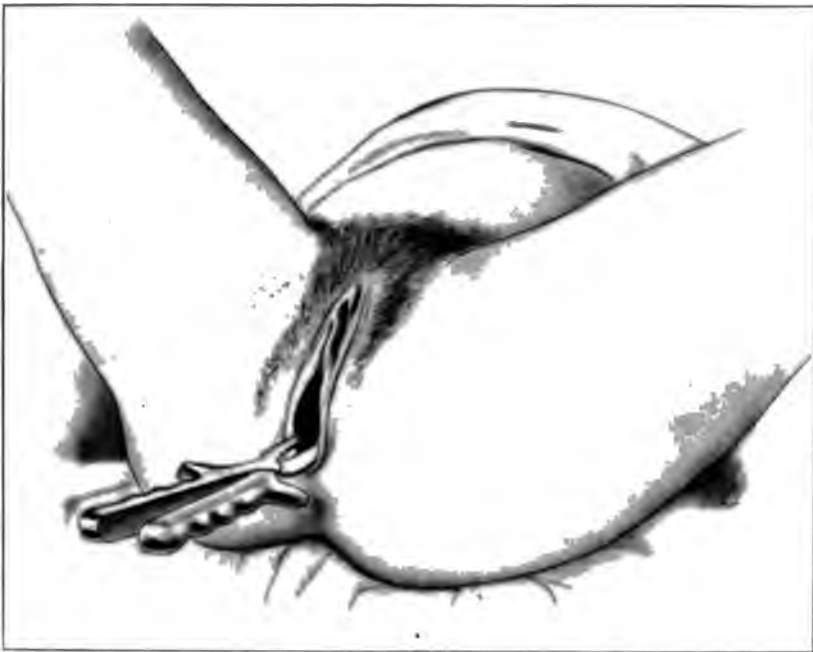


Fig. 96.—Forceps in position and locked.

folded towel. Obviously, the nearer to the fulcrum the power is applied, the less will be the force at the distal end of the lever. This fact gives to the axis-traction forceps its chief advantage, namely, that its power is applied above the lock.

Any forceps delivery which requires more force than can be applied with the muscles of the arm, becomes dangerous. The operation is a supplemental application of force, an aid, and not a supplanting of physiologic power. Likewise, nature's way

should be emulated in the manner of applying force; it should be rhythmical and intermittent, not continuous; for a baby is able to stand a moderate force extending over a long period of time better than a greater force exerted for a short time. During the rest pauses, one should listen at intervals to the fetal heart. An assistant may make the examination; or, the operator can listen for himself by manipulating the stethoscope with

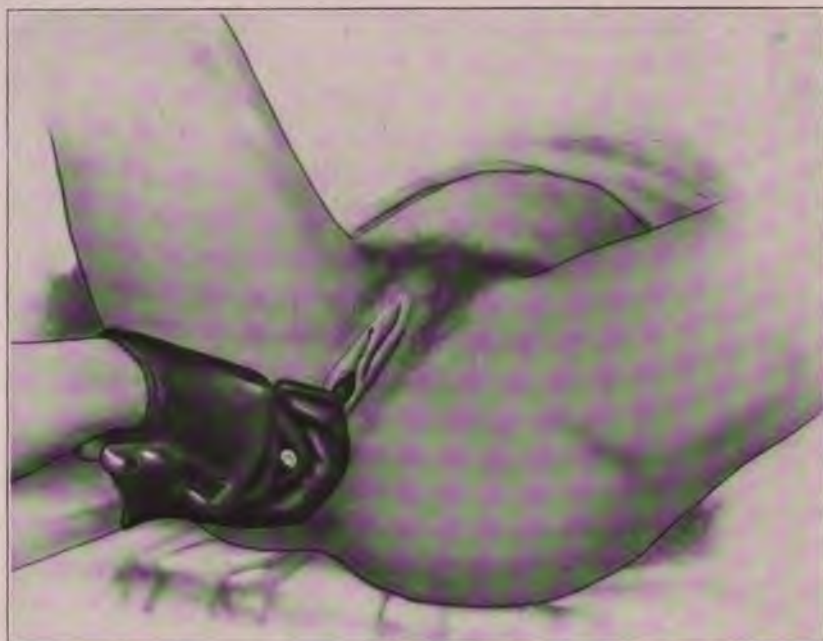


Fig. 97.—Traction.

sterile gauze, or by holding it with a sterile rubber band (Fig. 98).

In a low forceps delivery the head is drawn down until the occiput is well under the symphysis. When this point is reached, the handles are gradually elevated, the occiput being a fixed point around which the brow, face, and chin, respectively, revolve as they pass over the perineum. To perform this part of the operation most advantageously, the obstetrician stands at the side of the mother, generally the left side, grasps the forceps above

the lock, or about it, and continues the traction forward and upward. The possibility of injuring the soft parts, particularly the perineum, is always to be borne in mind when using the forceps. Its increased volume adds to the danger, and it can happen that the posterior edge of the blades will cut into the tissues if the handles are elevated too acutely.



Fig. 98.—Listening to the fetal heart without interrupting asepsis. The stethoscope, placed to the ears of the surgeon by someone other than himself, can be moved about by means of a sterile rubber band looped over his thumbs.

With the left hand, if one stand at the mother's left, the perineum is protected by regulating the advancement of the brow, and by gently stretching the taut tissues with the thumb and index fingers (Fig. 99). The anterior commissure may be pressed back in a similar manner thus freeing the occiput.

When the head no longer retreats during the interim between

the contractions, it may be fixed with the fingers pressed over the nose or chin, externally, of course, and the forceps allowed to remain loose, or, better still, removed altogether. With the fingers protected from anal contamination by the interposition of a sterile towel or dressing, the thumb of the same hand resting on the exposed scalp, one can slowly express the head.

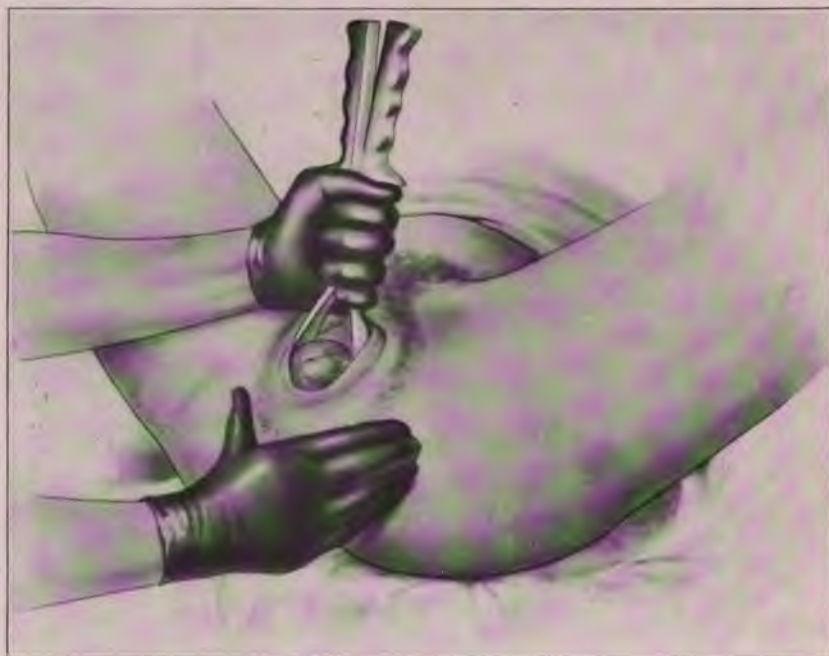


Fig. 99.—As soon as the occipital protuberance has passed the symphysis, the operator takes a position at the side of the patient. With one hand holding the forceps and making upward traction, the other supports the perineum and regulates the advancement of the head.

After the head is fully born, the occiput is urged toward the side of the fetal back; and the head is taken in both hands by the accoucheur, and pushed rather strongly (Fig. 100) against the perineum. This brings the anterior shoulder under the symphysis. The head is now elevated (Fig. 101) and slight traction made, whereupon the posterior shoulder slips over the perineum. The body of the child follows, the obstetrician offering only supportive assistance.



If the delivery of the shoulders is sometimes more difficult than such description would imply, rather than pull dangerously hard on the head, the finger should be passed into the axilla and traction applied there instead. Here, again, one must be careful lest the delivery of the shoulders injure the otherwise intact perineum.



Fig. 100.—Depressing the head in freeing the anterior shoulder. There is danger of causing Erb's palsy if too much force is used. (Bumm.)

Because of its pelvic curve the forceps is most favorably placed only when the blades are in the transverse diameter of the mother's pelvis. There are, however, situations in which rotation of the head has not assumed this advantageous position, making it necessary to adjust the blades at a different angle, and to readjust them as rotation takes place. If, for example,



the position of the head is slightly oblique, so that the small fontanel lies at one side, the blades may be applied laterally, and rotation completed as traction goes on. Only when the head lies low and the sagittal suture runs crosswise, or nearly so (deep transverse position of the head), rotation being arrested, must the forceps be applied obliquely. To place the blades



Fig. 101.—Elevating the head in freeing the posterior shoulder. (Bumm.)

laterally when the head lies in this position, one blade would rest over the brow, the other over the occiput, and it would be an impracticable and dangerous application to make. It would be only a little more secure if the head stood in the oblique diameter, for here the cephalic curve of the blades embraces the brow and occiput more to the side, the tip of one blade endangering the eye, the other pressing deeply into the suboccipital space back of the ear, such pressure often being the cause of facial paralysis.

The object always is to bring the occiput anteriorly; and, in order to do this, the blades of the forceps must lie in the opposite obliquity to that of the suture. That is, if the suture runs from the right side posteriorly to the left side anteriorly, or is directly transverse, the small fontanel in either case lying to the left, the forceps must lie from the left posteriorly toward the

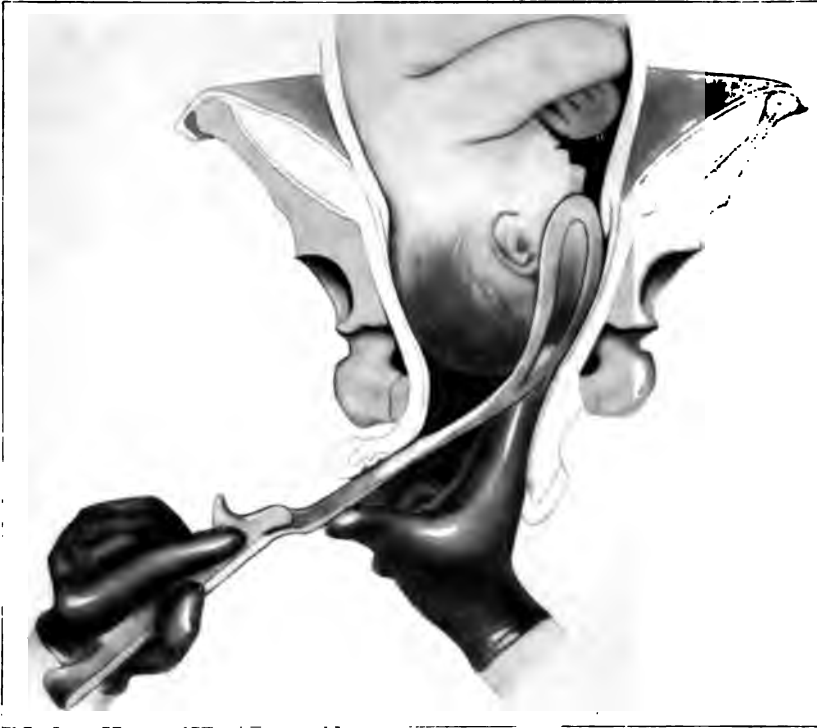


Fig. 102.—Applying the left blade in the oblique diameter of the pelvis.

right anteriorly; and vice versa if the head occupies the opposite obliquity.

If the forceps is to be applied in the oblique diameter (Fig. 102) one proceeds as follows: The first or left blade is introduced in the usual way, that is, in the left oblique; and made to lie in front of the sacroiliac articulation. The application of the second or right blade is more difficult. The two fingers of the

left hand which serve to direct the blade into the uterus, are also used as a fulcrum, and, by a prying movement, the blade is urged toward the symphysis, to a position opposite its fellow (Fig. 103). The two halves are now brought together and locked. In the extraction which follows, anterior rotation of the occiput is favored by giving the instrument a slight impulse in

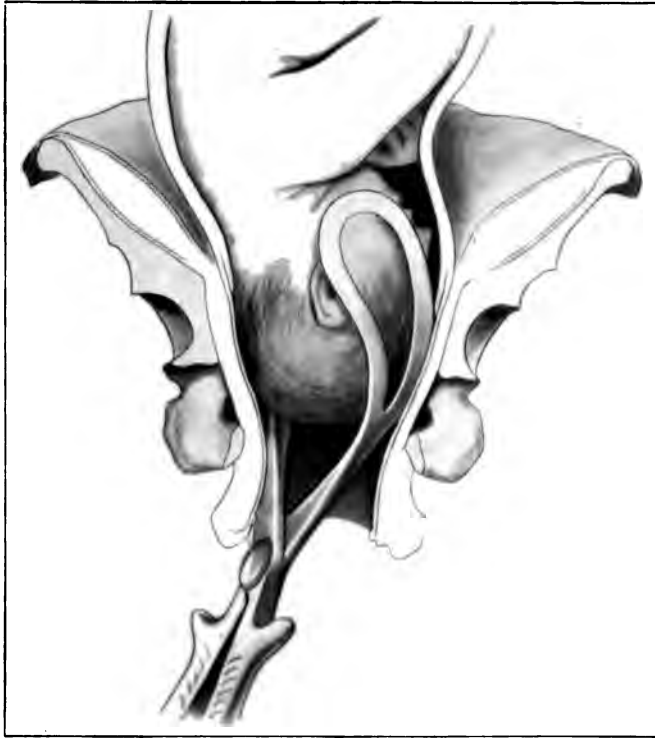


Fig. 103.—Forceps applied in the oblique diameter of the pelvis.

that direction with each pull. This must be done cautiously, imitating in a way the spiral movement of normal internal rotation.

If, in the attempt to apply the forceps laterally, one should undesignedly secure a sinecypit application, the extraction is continued as in those other cases in which efforts to slide the blade past the brow fail.

Sometimes, because of the ease with which the blades can be locked, one may be misled into thinking that there is good apposition when there is not; and occasionally there is difficulty in



Fig. 104.—A bad application of the forceps. Much pressure in this position would probably result in facial palsy; the hold, too, is very insecure.

getting the blades to lock at all (Fig. 104), or, if they do lock, to remain widely separated.

In a series of forceps deliveries the oblique application will be indicated seven or eight times in every one hundred cases.

### IN ABNORMAL POSITIONS OF THE HEAD

**Occipitoposterior Positions.**—It is the rule rather than the exception that a posterior position will rotate into an anterior one when the head meets with the pelvic floor. Refusing to assume



Fig. 105.—Forceps delivery in the occipitoposterior position. The glabella presses firmly against the symphysis; the occiput rotates over the perineum.

this more favorable adaptation to the canal, the head is born with the face anterior, an increase of about 2 cm. in the antero-posterior diameter. The increased diameter means increased strain on the perineum; and, since frequent disturbances are to be observed in the posterior position, even in spontaneous births, one may, for this reason, find it advisable to assist nature by the timely use of forceps.

In many instances it will be found that as the head is being drawn downward, it tends to rotate into an anterior position.



This should be encouraged, and, as soon as it has turned far enough, so that the forceps can be reapplied in the oblique diameter, further rotation may be accomplished by a readjustment of the instrument. In case the head will not rotate, the mechanism under forceps extraction corresponds to that of spontaneous birth. Traction is made downward and backward until the re-

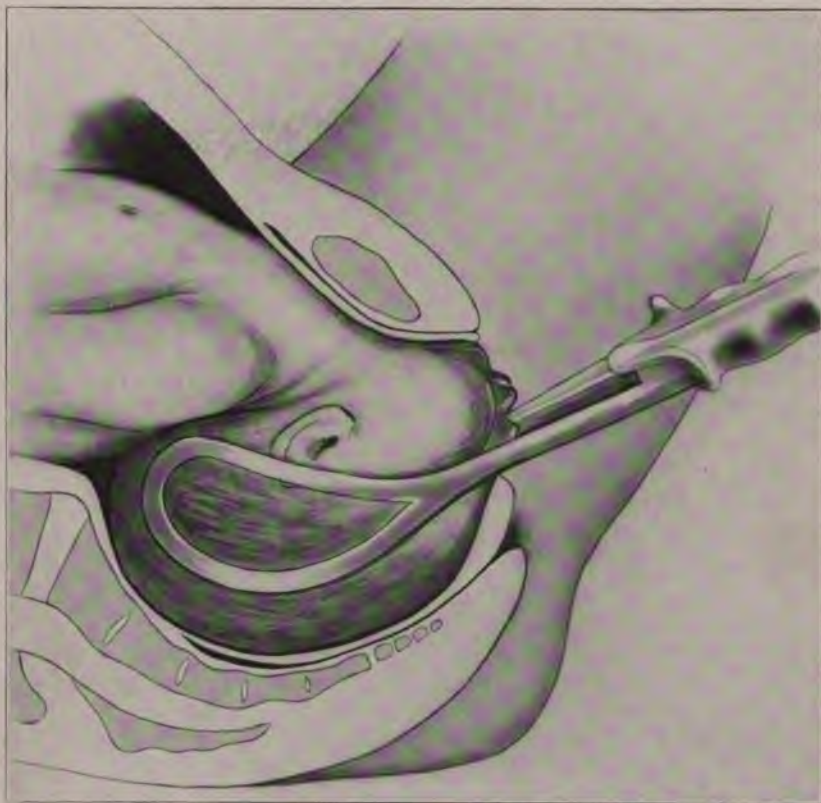


Fig. 106.—Forceps delivery in the mentoanterior position. The extended neck lies under the symphysis; the occiput rotates over the perineum. The head is greatly elongated.

gion of the brow appears under the pubic arch (Fig. 105). One then pulls upward with the forceps, the wide and voluminous occiput passing over the perineum.

Owing to the less favorable adaptation of the head in posterior positions, and the greater strain put upon the tissues in conse-

quence thereof, it is very commonly necessary, in order to save the perineum from more serious injury to incise the vulvovaginal wall laterally. (See Episiotomy, pages 332 and 336.)

In a thousand posterior positions taken from literature, the forceps has been required in 23.5 per cent of the cases.

**Face Positions.**—There are certain conditions when forceps may be employed to advantage in face presentation positions,

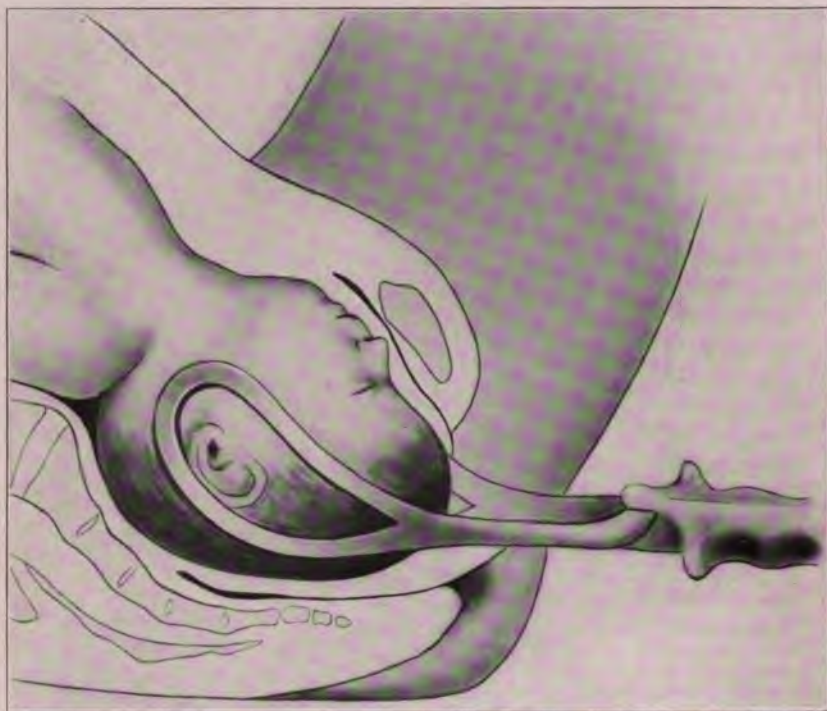


Fig. 107.—Forceps delivery in presentation by the brow. Traction is made downward until the superior maxilla has passed the symphysis; then with an upward curve the occiput is swept over the perineum. Note the greatly elongated head.

but the position should first be well established by bimanual examination under narcosis. If the head as far as the parietal eminences has entered the pelvis, one is justified in making the attempt to deliver; but only when the chin is directed toward the front, is the operation reasonably easy. In applying the blades it is important to get them over the parietal bosses (Fig.

106), only then is the head securely grasped. Traction should be made strongly downward until the chin passes under the symphysis. As soon as this point is reached, the forceps is elevated and the occiput delivered over the perineum.

Whenever the head is found deep in the pelvis, no matter what the position, one is justified in making a trial application of the forceps. If the head lies crosswise, and, surely, if it occupies an oblique position, the possibility of rotating the chin under the pubes is not remote. The hold, however, is very insecure and dangerous, since one of the blades lies over the point of the chin. For this reason the use of forceps in face positions is sometimes not practicable, and the attempt to effect delivery with it must be characterized as only a trial measure. After making reasonable effort without success pubiotomy or, possibly, cesarean section comes into consideration, if the child is alive. If the child is dead perforation and cranioclasia should be performed.

Even if the chin lies posteriorly, an exceptionally rare complication, a skillful obstetrician may succeed in rotating it anteriorly. The technic is not different from the Scanzoni method of rotating the vertex, but it is more difficult. After the same manner the forceps is applied obliquely, and the face brought into a transverse position. The forceps is then removed and reapplied in the other obliquity, and rotation completed. While such an operation is possible, it would, in the interest of the child, be better to perform cesarean section.

**Brow Positions.**—In positions of the brow manifold difficulties arise because of the greatly increased diameter between the superior maxilla and the occiput, which is almost as great as the mentooccipital diameter (13.5 cm.) and fully 2 cm. more than that of the pelvic outlet in its anteroposterior diameter. As a consequence the head becomes fixed in the pelvis, and calls for operative interference.

To insure success, the head must be well down in the pelvis and the nose pointed anteriorly, or at least, laterally directed. Under the guidance of the hand, the blades of the forceps are applied in the transverse diameter, care being taken that the cephalic curve is well over the parietal prominences (Fig. 107). Traction should be made downward until the region of the su-



perior maxilla presses under the symphysis, whereupon the handles are elevated and the occiput turned out over the perineum. The operation is exceedingly difficult in large children. Having failed to deliver by the above method, one may attempt to bring the face still deeper, that is, low enough to allow the chin to pass the symphysis.

### **HIGH FORCEPS DELIVERY**

When for any reason, the immediate termination of labor becomes necessary, the child living, and the head not engaged, the forceps is still counted a serviceable instrument. And when it comes to a choice between high forceps and cesarean section, the former operation is the less formidable in the hands of the average obstetrician. The experienced surgeon, however, would perhaps feel safer in delivering by the other route; but, in the emergency of general practice, forceps is preferable to the scalpel.

If one decides to use forceps, he must again consider whether the head has entered the pelvis in its greatest circumference, or is still floating above the superior strait. One must also know with reasonable certainty if the disproportion between the head of the child and the pelvis of the mother is such that it would be dangerous to perform the operation. Having determined its relative safety, the obstetrician proceeds after the following manner:

The patient is placed crosswise on the bed or on an operating table and prepared in the usual way for a surgical procedure. She should be deeply narcotized, and the hips brought to the edge of the table. The head is then pressed from the outside as deeply into the pelvis as it will go (Hofmeier's manipulation), and the forceps introduced in the usual way, except that, in place of two fingers, as in low forceps, it will be necessary to use all four, or even the whole hand, in guiding the blades high enough to make sure of their accurate and secure application (Fig. 108). It is sometimes very difficult, after both blades have been introduced, to lock them; and when they are locked the handles do not come closely together, because of the wide frontooccipital diameter of the child's head which is embraced.

Before proceeding to deliver, the operator reassures himself that application has been well made. He does this by making a trial traction. With one hand pulling on the forceps in the usual way, the fingers of the other hand resting against the head



Fig. 108.—High forceps delivery. The head occupies a transverse position at the pelvic brim, and the blades are applied in this position; but, in order to guide them into place, the half or perhaps the whole hand will have to be introduced into the vagina.

of the child, he can judge if the blades have taken a firm hold. If they have not, the fingers will be separated from the advancing part, and a readjustment of the blades must be made.

After making a fair test in this way, the operator crouches

in front of the patient, or if he prefers, sits on a low stool, and takes hold of the forceps from below. Traction is made downward toward the floor. Much force is not permissible, yet one can not hope to draw an object like the head through a constriction so unyielding as the pelvis without considerable effort; nevertheless, the procedure must not be a tug of war.

Where a little more room is needed, an expedient of some value is to hang the woman over the edge of the table in the Walcher position. By springing the pelvis in this way a slight increase is gained in the conjugate diameter (Fig. 7).

Compression of the child's head is unavoidable; therefore, it becomes necessary after each effort to separate the handles for a few moments before renewing traction.

If, after making eight or ten such efforts, the head can not be brought down, the child still living, other means of delivery, such as pubiotomy, version, and cesarean section, have to be considered. If the child has succumbed, it may very properly be delivered by the cranioclast.

In bringing the head down into the pelvis, the strait is passed in its transverse diameter; and unless, perchance, the head turns within the blades, the forceps should be taken off and reapplied obliquely. Such a fortunate evolution as the rotation of the head between the blades is one of the advantages made possible by the solid blade forceps of McLane.

Opinions differ widely concerning the claim made for the axis-traction forceps. One well known obstetrician says, "I use this instrument in all cases; without the traction rods in low and mid- and with them in high forceps operations." Another testifies that in actual practice where he has applied both instruments on the same case, he has been better pleased with the simple Simpson forceps, and he seldom uses any other. My own convictions are that while the axis-traction forceps (Fig. 109) possess advantages, the Tucker-McLane instrument is capable of accomplishing all that should be expected of forceps. In this I am constantly reminded of the statement made long ago by Baudelocque that it is not so much the instrument which is to be looked to, as the hand that uses it. One must know one's tools

thoroughly, their possibilities as well as their limitations, if one would do good work.

By means of the axis-traction device, it is possible in the high delivery to make traction nearly at a right angle with the superior strait; and, owing to the universal bearing of its articulations, the Tarnier instrument can be used in any position. This, again, is counted a disadvantage by those who are accustomed to

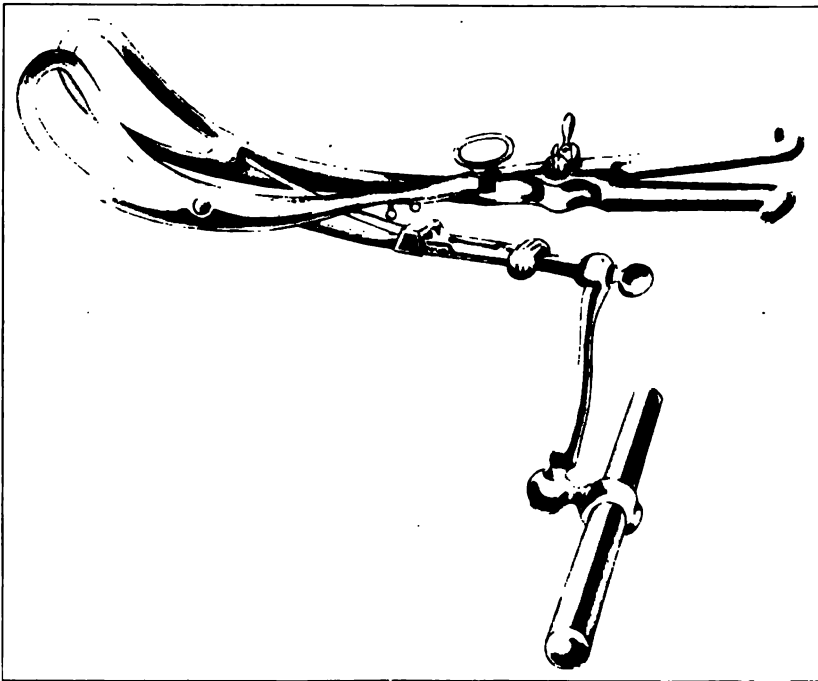


Fig. 102.- Tarnier axis-traction forceps.

the more positive action of the simple forceps. (Fig. 110.)

The manner of applying the blades is no different than in the plain forceps. After articulating the blades they are made secure by a thumb screw. The operator frees the traction-rods from the pin which holds them in place upon the under surface of the shank, and slips the movable sleeve of the traction-bar over their notched ends. The complete attachment terminates in a bar, which may be grasped by one or both hands.

In making traction with the Tarnier forceps, it is advised that at all times the handle be held horizontally, no matter what po-

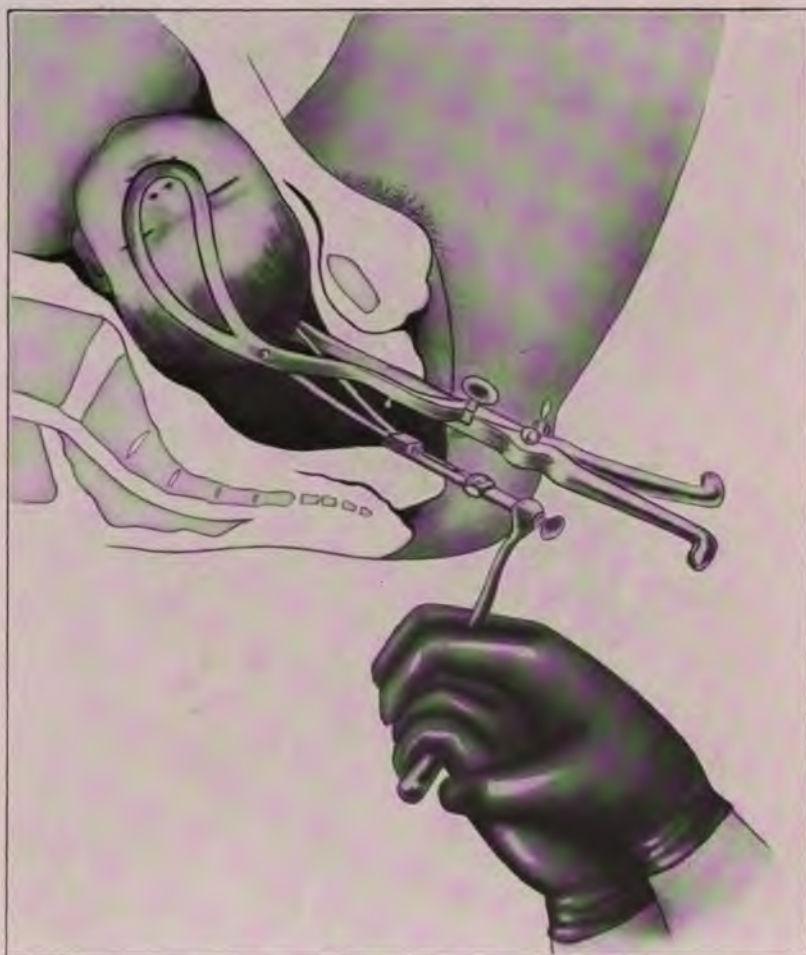


Fig. 110.—Delivery with the axis-traction forceps. The head is grasped as it lies transversely at the pelvic inlet, one blade over the face, the other over the occiput. Traction is made entirely on the bar and in the direction of the pelvic axis.

sition the blades may assume; also that the traction-rods be kept close to the under surface of the handles. Whether or not the instrument be unlocked and removed when the head reaches the

perineum, is a matter of choice. Tarnier himself taught that it should not be unlocked.

### **SPECIAL DIFFICULTIES ARISING IN THE USE OF FORCEPS**

Under certain circumstances the introitus may be so contracted that the introduction of two fingers, not to mention the whole hand, can not be made without occasioning pain. In such cases it is not wise to use force at the risk of lacerating the tissues, but, instead, the opening should be enlarged by a vaginoperineal incision.

In trying to pass the blade between the fingers and head it will sometimes not go forward; and, if forced, it may make a false passage. One must, therefore, vary the course of its introduction.

In the event of an arm or the umbilical cord lying low, the introduction of the blades should be made with special precaution in order that only the head and no part of the arm or cord be included in their grasp.

It is difficult to lock the blades if they occupy different levels. In such cases one undertakes through strong depression of the handles to bring about their proper union; but it may be necessary to take them out, and put them in again before a secure articulation can be effected. If one fears that the forceps may have slipped, traction should be stopped at once, and the instrument reapplied; otherwise grave injury to the child and serious trauma to the mother can result.

In hopes of saving the perineum, one will sometimes remove the forceps from the head too soon, before the parietal bosses have passed the ischial tuberosities, and it may have to be put on again; therefore it is wise to make sure that the head has been brought far enough down to be held without such aid.

If the child is dead, the forceps should not be used; but, instead, the head should be perforated, and the delivery completed with the cranioclast.

The use of forceps on the after-coming head is recommended if the attempt to deliver manually fails. Generally speaking, though, the forceps is of no avail when the head can not be de-

livered with the hands. The chances are that by the time one has demonstrated the futility of manual delivery the child has perished. Still, one is justified in trying the forceps. The body of the child is held above the symphysis by an assistant, the operator introducing the blades laterally to the sides of the head through the guidance of two or more fingers. In order to lock the handles, they must be firmly depressed. The line of traction is first backward and downward, then horizontally forward, and, finally, upon the exposure of the mouth, slowly upward.

Although the obstetric forceps is not designed to be used on the breech, one may sometimes venture to employ it if application is made in the bisiliac diameter of the child's pelvis. Only light traction is permissible, and much pressure on the handles must be guarded against.

### PROGNOSIS IN FORCEPS OPERATIONS

The prognosis in forceps operations, if one hold himself strictly to the indications and observe the preliminary conditions, is good. The chief harm to the mother that comes from its use is through infection, which is rare, and lacerations of the soft parts, which should not be greatly increased. Where infection is already present, the invading microorganisms are only intravaginal and not intrauterine; and it is not easy for the germs to get beyond the cervix, unless they are carried beyond by the forceps or the fingers.

In 562 cases of forceps delivery at the Koenigsberg clinic, the following analysis has been published:

- 17 of the mothers died following the operation:
  - 11 from eclampsia and its sequences.
  - 2 from lung and larynx tuberculosis.
  - 1 from nephritis and lung infaret.
  - 1 from rupture of the uterus, which occurred before forceps.
  - 1 from infection, which existed before forceps.
  - 1 from infection through forceps, due to perforation of the vaginal connective tissue.

Charging both cases of infection to the forceps, there was a maternal mortality of 3.38 per cent.

As regards morbidity, only 157 cases were observed with accuracy. Of these—

59 had a temperature during the puerperium above 38 degrees Centigrade, or 37.6 per cent.

21 of these had no connection with the forceps.

34 of the others had a very slight rise of temperature, and this lasted but a short time.

4 had severe infection, or 2.5 per cent.

Fetal mortality: Of the 562 deliveries, 70 of the children died, or 12.45 per cent. (Asphyxia was already present to some degree before operation.)

The lacerations of the mother that came to notice were:

11 of the uterus.

1 of the vaginal connective tissue.

4 of milder degree of the vagina.

39 incomplete tears of the perineum.

4 complete tears of the perineum.

4 of the clitoris.

To avoid laceration:

32 times the cervix was incised.

139 times the vaginoperineal tissue was incised.

Of the injuries to the child the following were observed:

40 had some degree of facial paralysis.

2 had a large hematoma of the cheek.

1 had a large hematoma of the ear.

1 had a large hematoma of the nose.

1 had a subdural hematoma.

2 had an intracranial hemorrhage.

1 had a fracture at the base of the skull.

Besides these injuries there were two with fracture of the clavicle, one that had occurred in the extraction of the shoulder, one from artificial respiration after delivery.

**Injuries to the Mother.**—The forceps, *per se*, is seldom the cause of maternal injury. Forcibly introduced it is possible to push the blades through the vault of the vagina, or even through the lower uterine segment; but with reasonable care the mere passage of the instrument is unaccompanied by harm. But many more injuries come with the extraction, both to the osseous as well as the soft tissues. The higher the head at the beginning of extraction, the greater will be the injuries sustained; and the



proportion of damage bears a close relation to speed. The head is not only increased in size by the volume of the instrument, but it is dragged through the canal in a comparatively short time and without undergoing the process of molding.

The probability of the cervix being lacerated is increased if the forceps be applied before full dilatation has taken place. If, as sometimes is permitted, instrumental delivery is undertaken before this, one must proceed with great care. Should necessity demand haste, there are other and better ways of overcoming the resistance than by pulling the head through by main strength.

The consideration of cervical lacerations is taken up elsewhere, only slight reference being made to them at this point. As a rule, such tears are lateral, and do not extend into the vaginal wall; and a suture is demanded only when there is severe hemorrhage. If the cervix has been badly torn in a previous birth, the danger of its tearing again is increased, even more extensively than in the first instance.

All the soft parts are particularly exposed to laceration when forceps is used to complete delivery after pubiotomy or symphysiotomy has been performed.

Less frequently than cervical and perineal tears, but occurring often enough to deserve consideration, are the injuries to the anterior commissure. The most fruitful source of such trauma is the too early elevation of the handles. Before the occiput has passed under the symphysis, the blades are pried against the pubic bone, and the tissues cut by their sharp edges. The vascularity of this area makes it necessary when lacerated to ligate the dorsal artery of the clitoris.

Extensive and serious injuries of the soft parts may also come from the blades slipping off the head, the operator pulling the locked forceps rapidly through the birth canal. To avoid such an accident one must correctly diagnose the position, and accurately apply the blades before making traction. He should also, from time to time, investigate and note whether their fixation to the head is secure.

The osseous structures of the mother also may suffer injury. In studying the dynamics of forceps delivery it will be seen that force is exerted in two directions, one against the pubes,

the other along the pelvis axis. Thus would it be possible, in making traction, to rupture the symphysis, if force enough were applied. The sacroiliac joint, if ankylosed, can be broken in the same way. Fortunately, such accidents are rare and can hardly occur under ordinary circumstances.



Fig. 111.—Hematoma of the cheek, due to injury from forceps.

**Injuries to the Child.**—As already pointed out, the function of the forceps is chiefly that of traction; but while performing this office, it necessarily becomes an instrument of pressure, as well. It follows then that the greater the tractile force, the

greater will be the compression. Bruises and contusions of the face and scalp, severe abrasions of the epidermis, deep pressure marks, ecchymoses, and even hematomata, are common (Fig. 111). If the pressure of the blade comes over the styloid foramen, where the seventh nerve makes its exit, a one-sided palsy of the face commonly results. Still more serious may be the pressure on the skull and brain, whereby the bones may be fractured or the brain compressed. Also in pulling the head through the contracted pelvis, as becomes necessary in high forceps delivery, the posterior parietal bone may suffer an abrasion, or even become depressed as it passes over the promontory of the sacrum. The occipital bone may be forced loose from its articulations with the temporal, and the medulla oblongata penetrated; the temporal, parietal, and frontal bones may be split, the orbit crushed, and the base of the skull fractured. It is particularly dangerous if, in injuries of this sort, the fracture extends into one of the sinuses of the brain. The symptoms of such a lesion are like those of simple pressure; but the prognosis is made much worse by the hemorrhage.

In a frontooccipital application of the forceps, as in the high operation, one must be extremely cautious, for the point of one blade endangers the eye, the other the neck. Injuries so serious as the enucleation of an eye and the paralysis of an arm (Erb's palsy) have followed this use of the forceps. Similarly, the tip of the blade may impinge on the umbilical cord as it crosses the neck, causing asphyxia and death of the fetus. So simple a procedure as the withdrawal of a blade may, if one be incautious, tear off an ear, which is only possible if the blade is fenestrated.

### EXPRESSION OF FETUS

Hardly to be counted an operation, although a definite procedure, expression of fetus is deserving of more than passing notice; for, of all the artificial aids to delivery, compression of the abdomen in some form or other is undoubtedly the most primitive of ancient practices. The method of application has changed, but the principle is quite the same.

After the method of Hofmeier, the head is made to engage

in the milder cases of pelvic contraction by means of external pressure. After overcoming the resistance at the inlet, birth is allowed to go on spontaneously; but it may be ended instrumentally. The operation does not contemplate the complete expression of the child. The procedure is simple, but to be effective it must be practiced slowly and with considerable force. Standing at the side of the patient toward which the back of the child is turned, the operator places his hand on the fetal head in such a way that the thumb is applied to the occiput and the fingers to the brow. Strong pressure is made in the direction of the sacrum, the object being to force the head into engagement. Narcosis is essential to success, and the trial should be undertaken when the uterus is relaxed.

Another method favors the transverse engagement of the head, and simulates somewhat the mechanism of the high forceps delivery. The fingers of one hand are applied to the sinciput, and those of the other to the occiput. At the same time an assistant presses firmly on the head over the symphysis. The head is thus forced in the direction of the conjugata vera (Fritsch's method). It is of further advantage to have the patient in the Walcher position. Whether the attempt has succeeded or not can generally be made out from external palpation alone, but should be verified by internal examination. For fear of injuring the lower uterine segment, pressure should not be prolonged; and, of course, pelvic contractions of a high degree contraindicate the attempt being made at all. One should also take into account the degree of molding that is possible.

It is well to remember in this connection that before carrying out the high forceps operation, it is always wise first to try to press the head into the inlet of the pelvis. The trial not only helps one to estimate the amount of dystocia to be overcome, but the impression is a marked aid in the application of instruments.

Extraction of the breech also is made decidedly easier if strong pressure is made on the abdominal wall, for not only is the expenditure of tractive force thereby lessened, but the attitude of the child is preserved, the arms remain crossed on the breast, and the chin pressed against the sternum. While the obstetrician is applying the various maneuvers of extraction *per vaginam*,

his assistant presses upon the abdomen with the outspread hands, the thumbs on the anterior surface, the fingers covering the sides as far posteriorly as possible.



Fig. 112.—Kristeller's expression.

Kristeller recommends a procedure whereby in head positions the supplemental force of abdominal pressure may be used in place of forceps. The indications are the same. The operator

stands by the side of the patient facing her feet. With both hands he holds the fundus of the uterus in such a way that his thumbs lie on the anterior surface, and the other fingers on the lateral walls of the uterus. Awaiting a contraction, a slow, increasingly strong pressure is exerted until the pain has passed. The procedure is repeated a number of times, generally five to ten being sufficient (Fig. 112).

The advantages of the operation are its freedom from possible infection and the preservation of the child's posture. Opposed to it, stands its limited utility. Only in complete dilatation and a yielding disposition of the soft parts, in normal pelves and small children,—in short, in the absence of resistance, can one reasonably hope to succeed. The situation which offers the best chance of success with it is the retardation in the birth of the second child in twins, and the arrest of birth in a multiparous woman shortly before the head enters the superior strait. Nor is the procedure free from danger: the placental area may become compressed and the fetal circulation disturbed; even placental detachment has been known to occur. It is therefore essential that the fetal-heart sounds be observed frequently, and that other means of delivery be instituted should expression be accompanied by unfavorable symptoms.

lated; second, the pelvis must be large enough to permit the head to pass after it has been performed. With regard to the first of these requisites, it is obvious that the os must be open enough to allow the guiding fingers, together with the perforator, to



Fig. 113.—The Naegele perforator.

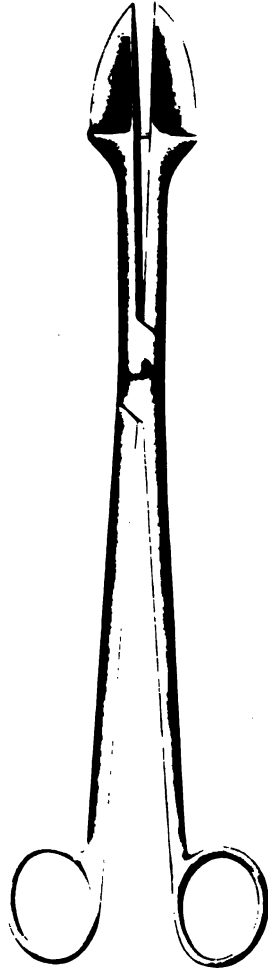


Fig. 114.—Smellie perforator.

reach the point on the head where the perforation is to be made; therefore an aperture smaller than a silver dollar would not be large enough for cranioclasia. Should there be any need of haste the cervix must first be opened by artificial means.

### METHOD OF PROCEDURE

**Instruments, Preparation, Narcosis, etc.**—There are two types of instruments used, one a perforator, the other a trephine. The perforator is essentially a spear-pointed divulsor with a cutting edge. The handles of the Naegele instrument (Fig. 113) are connected by a jointed bar so devised that the instrument locks, and can not be opened without first releasing the catch; the Smellie perforator (Fig. 114) has no lock. The other instrument is designed to cut a piece out of the skull instead of being forced through it. The circular end that does the cutting is guarded by a sleeve of metal which is drawn back out of the way when the process of cutting is begun. By a twisting movement of the wrist a section of bone as large as a five-cent piece is trephined away (Fig. 115.)

The Braun cranioclast has two blades that cross and lock like the obstetric forceps. The handles also are constructed after the same principle (Fig. 116). The instrument is designed to take a strong hold on the object it grasps. To secure this vantage, it is fitted with a threaded bar attached to the handles upon which travels a thumb screw. By turning this screw the cranioclast is clamped upon the fetal tissues as tightly as may be desired. Both blades are similarly curved so that they come together securely, the internal being solid, the external fenestrated, one fitting over the other. The three-blade cranioclast differs from the two-blade in that the extra blade stands between the other two, and is pointed, more like a perforator (Fig. 117). Both instruments resemble the earlier cephalotribe.

The specially constructed bone forceps of the Mesnard-Stein model (Fig. 118) is curved, has alligator jaws, and is sometimes made to lock when closed. The instrument of Boer (Fig. 119) is straight, the biting surface of the blades being studded with peg teeth. Both instruments are strongly made.

The instruments to be sterilized are perforator, cranioclast, bone forceps, scissors, a strong metal syringe of 100 c.c. capacity, and an irrigation tube (Fig. 120) specially designed for washing out the brain substance.

Disinfection of the patient and the operator should be thorough.



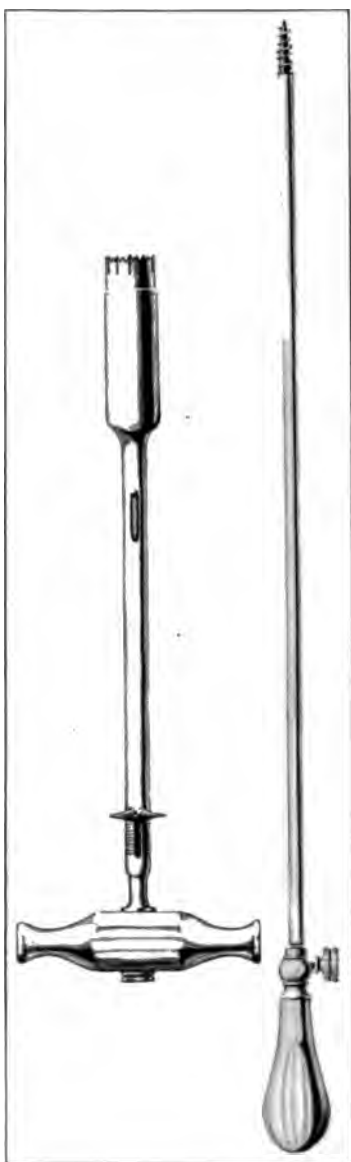


Fig. 115.—Kiwisch-Martin trephine with obturator.

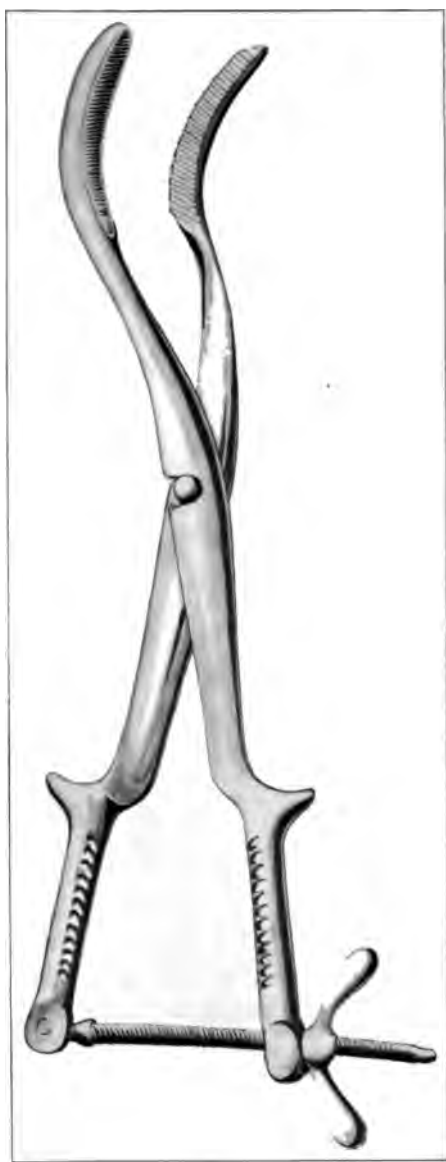


Fig. 116.—Braun-Gessner cranioclast.

A pail of water is kept near the operator in which to plunge the fetus should it still show signs of life when delivered. It seems almost incredible that a child could survive perforation



Fig. 117.—Tribladed cranioclast.

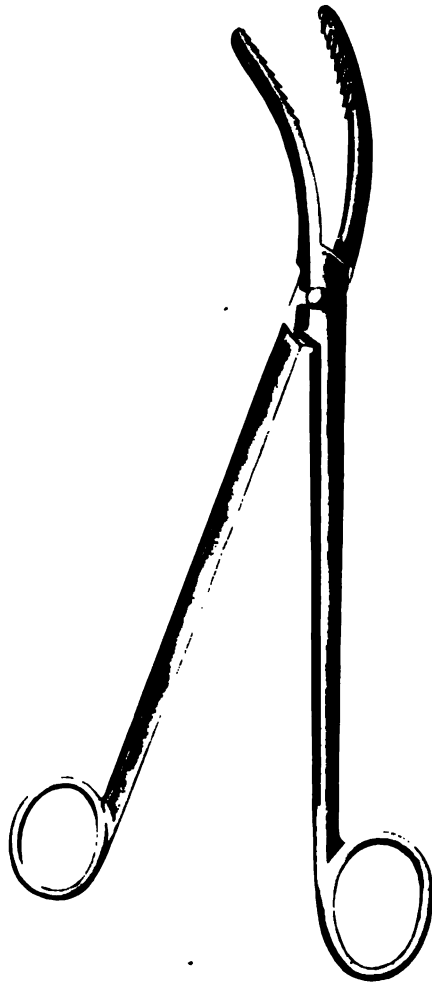


Fig. 118.—Mesnard-Stein bone forceps.  
Curved. Alligator teeth.

and cranioclasia even for a brief moment, but, unless the vital centers at the base of the brain are destroyed, respiration and circulation may continue for some time.

Narcosis is not always necessary so far as pain is concerned; but, on the grounds of humanity, it is desirable. For the mother to be conscious of the mutilation taking place is needlessly shocking. The operator should make a final and careful examination



Fig. 119.—Mesnard-Stein bone forceps.  
Straight. Peg teeth.

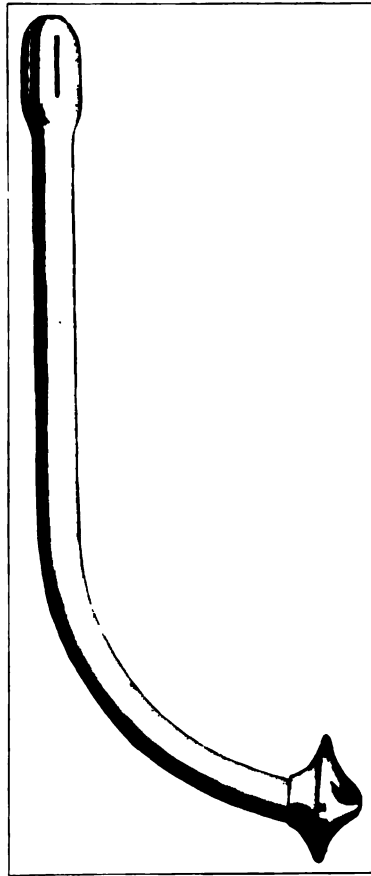


Fig. 120.—Irrigating cannula.

while the patient is under the anesthetic, to determine beyond doubt whether the child is alive.

**Perforation of the Advancing Head.**—If the head is not already fixed in the pelvis, it should be securely supported at the inlet by an assistant. Puncture should be made at the time of a contraction. The operator sits facing the patient as he would

in a forceps delivery. The closed perforator is taken in the right hand; with the other he guides the point of the instrument along the vaginal canal and through the dilated cervix to the surface

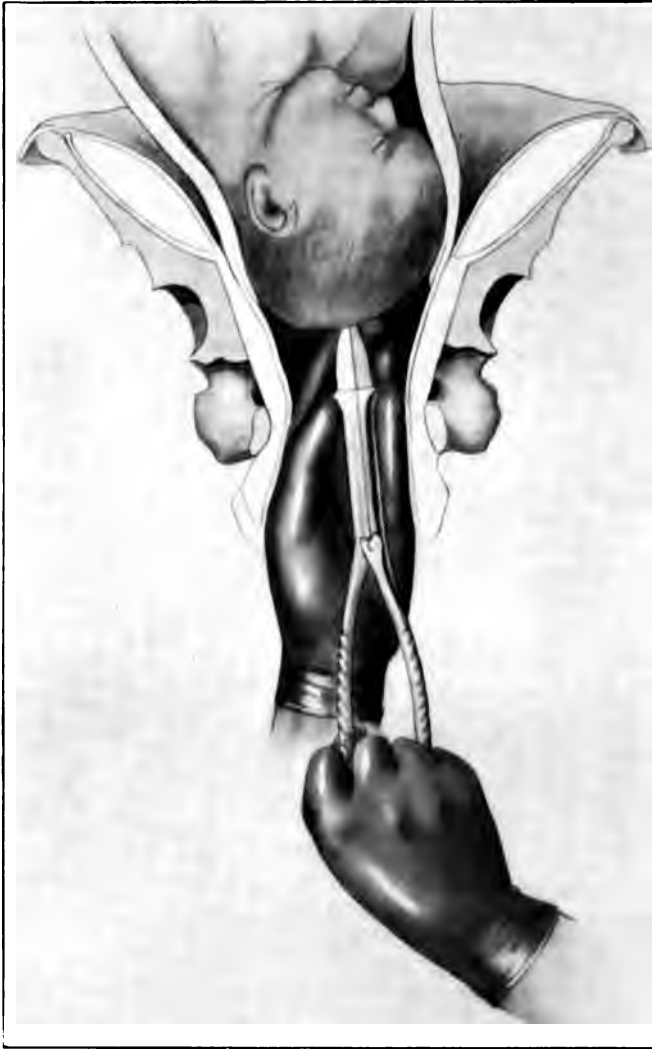


Fig. 121.—Perforating the advancing head with the Naegele perforator.

- of the head where the perforation is to be made (Fig. 121). Placed at a right angle to the scalp, preferably over a suture or

a fontanel, the perforator is forced into the cranial cavity up to the shoulder on its blades, the locking device is released, and the blades are separated by squeezing the handles together. This done, the instrument is closed, locked, turned quarter-round, and the process of cutting repeated; afterward it is closed and cautiously withdrawn. If neither fontanel nor a suture can be reached, as, for example, in the presentation



Fig. 122.-Trephining the head with the Kiwisch-Martin trephine.

of a parietal bone, the instrument is placed against the bone and a hole drilled through it.

The trephine serves the latter purpose better than the perforator. With the right hand the center rod, or obturator, is screwed into the head, being directed to the place of entry by the fingers of the left hand as above described. The trephine portion is then slipped over the obturator until it meets with the head of the child. A few turns are sufficient to cut through the bone, a transfixed button of which comes away with the instrument (Fig. 122).

Before applying the cranioclast it is essential that the convolutions be broken down, and their substances washed out. This is done with a metal cannula and a strong syringe. The cannula is like an irrigating tube, one end having a bulb point with numerous openings, the other designed to receive the nozzle of the syringe. The tube is pushed into the head as far as it will go, the attempt being made to destroy the vital centers at the base; at the same time the contents are thoroughly broken up. A syringe filled with sterile water is now connected with it and forcibly injected

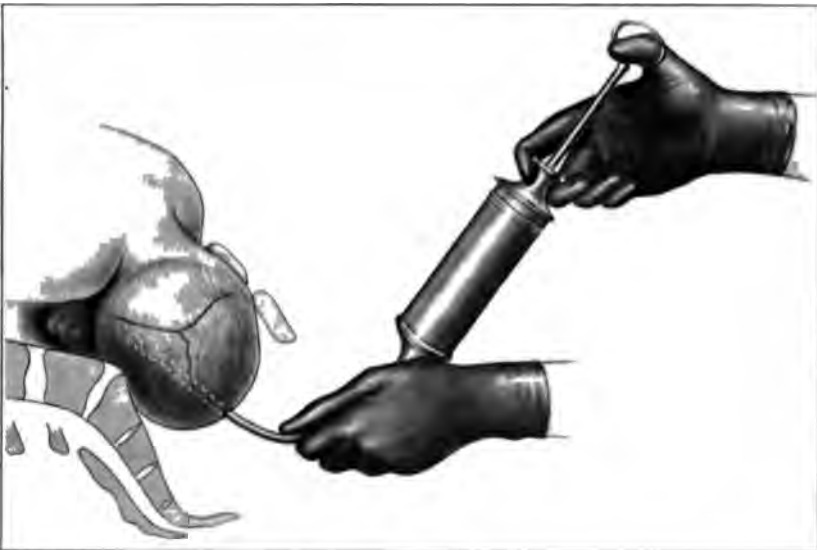


Fig. 123.—Forcing water into the trephined head through a cannula after the brain substance has first been broken up by it.

(Fig. 123). This is repeated several times, portions of the brains coming away with each injection.

To penetrate the brain through the brow or face with the Naegele perforator is hardly possible, except by way of the orbit or between the frontal bones. The former is the easier and more accessible route. If the trephine instead of the perforator is employed in this region, the opening is best made through the brow. If it is a hydrocephalic fetus, a simple trocar, or even a large aspirating needle, may answer the purpose for perfora-

tion, since the enlargement of the head is due to fluid rather than to brain substance.

**Perforation of the After-Coming Head.**—Perforation of the aft-



Fig. 124.—Perforation of the after-coming head with the Naegle perforator. Downward traction is made on the child's body by an assistant. The perforator, held in the right hand of the operator, is pushed through the skin in an upward direction at the lower border of the sternomastoid muscle.

er-coming head is a much more difficult procedure than the foregoing. The conditions that demand the operation are the same, but with the child's body born and the head still within

the pelvis, usually above the superior strait, entrance to the brain becomes exceedingly difficult.

The most favorable point for perforation is through the foramen magnum, to reach which one proceeds as follows: An assistant makes traction downward on the body of the child. The operator takes the perforator in the right hand, and carries it

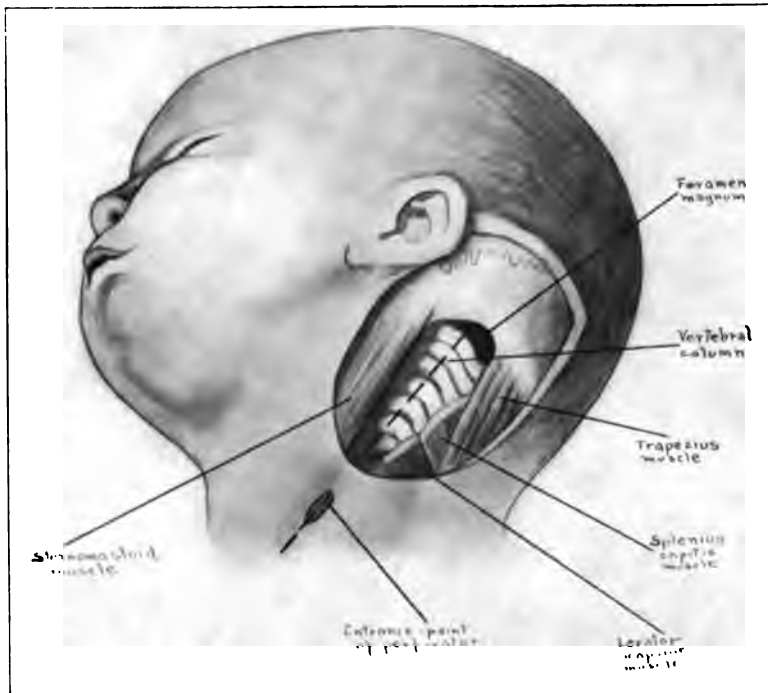


Fig. 125. - Dissection of the neck, showing the course of the perforator. (Hammerschlag.)

to the posterior border of the sternomastoid muscle. Here, in the neighborhood of the base of the skull, the point of the instrument is forced through the skin and musculature to the bone (Fig. 124). A rather free opening is made. With the index finger of the left hand, one now palpates for the angle between the vertebra and the occipital bone. When this landmark is located, the point of the perforator is made to cut its way forward, separating the atlas from the skull, and opening a passage to the foramen (Fig. 125).



**Extraction of the Perforated Head.**—The sequence of perforation is extraction; and, if the head be in advance of the body, extraction may best be accomplished with the cranioclast. The following is the method of employing it:

The head of the child should be supported by an assistant if it is not already fixed in the pelvis. The operator takes the solid inner blade in the right hand; not as a pen, as was directed in the use of forceps, but as a fencing foil. Under the guidance

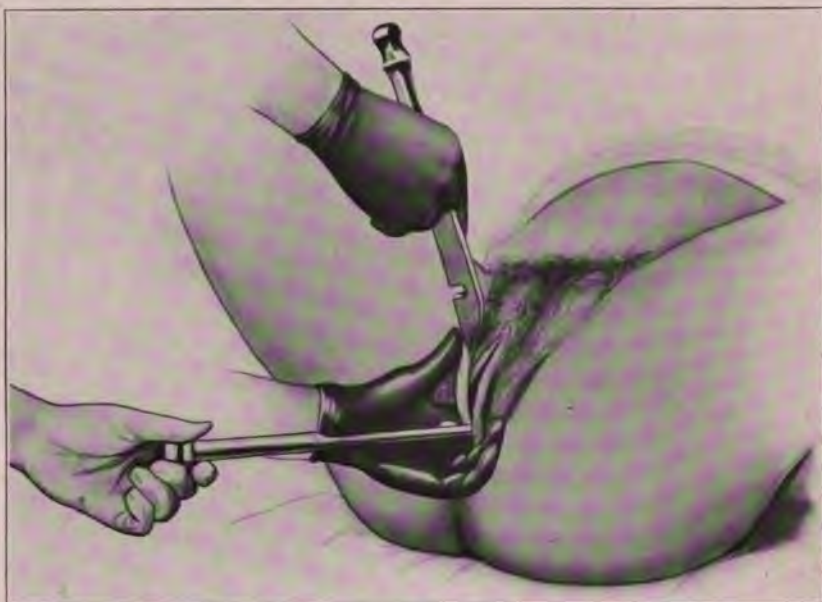


Fig. 126.—Cranioclast. The inner, solid blade of the cranioclast has already been passed through the perforation into the head, and is being supported by an assistant. The outer, fenestrated blade is being applied over the face.

of the left hand, the head of the blade, with its convexity toward the face of the child, is shoved into the opening made by the perforator or trephine as far as it will go, stopping only when it reaches the base of the skull. This half of the instrument is held by an assistant while the other is being placed in position. The head need not now be so firmly pressed upon from above (Fig. 126).

To introduce the second blade, the operator manipulates it

into position much as he would the second blade of the obstetric forceps, and the handles brought together and locked, one blade inside the head, the other outside (Fig. 127). They hold best



Fig. 127.- Cranioclast. Seen from the inside. The blades have been locked and are now being clamped together.

when fastened over the face, but placed at the back or sides of the head they are competent under most circumstances to bring away the fetus.

In the first position of the vertex, the second blade is locked from above; in the second, from below. This is not difficult since the cranioclast has no pelvic curve, and the blades may be introduced interchangeably. The point to be borne in mind

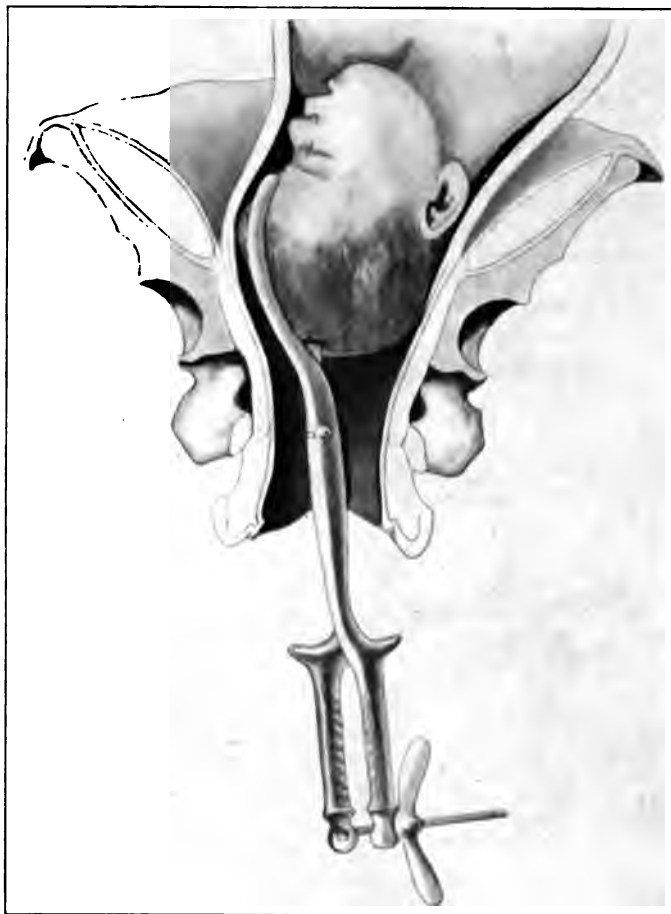


Fig. 128.—Cranioclast. The compression screw to its maximum has been tightened, firmly fastening the cranioclast to the child's head.

is, that the concavity of the second blade must fit over the convexity of the first, whether the grasp is applied to the occiput or to the face. It is slightly more difficult to lock the blades

from below than from above since one must depend more on the sense of touch.

Proper articulation accomplished, the compression screw is affixed to the handles and tightened. (Fig. 128.) Before applying traction, a final inspection makes sure that none of the soft parts of the mother have been included in the clamp of the instrument.

Delivery is essentially the same as a forceps extraction; and, like forceps, traction favors rotation generally in the direction



Fig. 129.—Extraction with the cranioclast. The technic is essentially the same as in forceps delivery.

most favorable to delivery. The same mechanical principles apply. If the head stands at the brim of the pelvis, traction is made downward; if it lies in the excavation, one pulls horizontally; and when the head passes over the perineum the cranioclast is elevated (Fig. 129).


In cases of more marked pelvic contraction, when one doubts the possibility of extracting the head with the two-bladed cranio-

elast, the three-bladed one may succeed. Its action, as already remarked, is more like the cephalotribe. The technic is as follows:

The middle, or first blade is held in the right hand, and is passed up to the point on the head where puncture is to be made. With a boring movement it is made to enter the skull, and is forced through the brain to its base. While this is being done, an assistant, as in all such procedures, holds the head securely from the outside unless it is already fixed in the pelvis. The smaller of the two remaining blades is now applied over the occiput, and articulated with the one already in place. The first branch of the instrument has no identifying points of construction by which the position it occupies within the head can be told. To avoid such confusion the handle is marked with a figure on its anterior surface, which indicates the direction it should take. The introduction of the third, or last blade does not differ from that already described, the concavity of the blade fitting over the sinciput. Articulated with its mate, the compression screw is moved over to this blade, and tightened enough to admit of all three locking. The force accompanying the manipulations causes a free discharge of brain substance with consequent reduction in the size of the head.

Extraction of a perforated head that lies low in the pelvis hardly requires the use of the cranioelast, the strong bone forceps of Stein-Mesnard being quite sufficient. The instrument is really a cranioelast, only of a simpler form, and is manipulated in much the same way.

Only exceptionally is extraction with the cranioelast necessary in breech-births. After the head has been punctured, the Veit-Smellie method of delivery is usually easy of accomplishment, especially if aided by external pressure. Besides helping expulsion directly, such pressure causes the discharge of brain substance, and indirectly favors extraction from reducing the size of the head. This method will fail only when the cranial bones are exceptionally hard. If cranioclasia is necessary, the inner branch of the instrument is pushed through the foramen magnum, and the outer blade, lying against the occiput, is clamped over it.



### **DIFFICULTIES ATTENDING PERFORATION AND CRANIOCLASIS**

To attempt perforation while the head is wobbling about in a state of uncertainty, would be dangerous, as well as futile; the head must first be immobilized. Also one must apply the perforator at right angles to the surface to be punctured. Obliquely directed, its point wanders off under the scalp, and may go so far as to wound the mother. There are few difficulties, however, to be met with in operating on the head when it comes first, as compared with when it comes last; for, in the latter situation, before the perforation can be made, a canal must be formed between the outside skin and the point of entrance to the brain. In forcing the perforator along this course, it is an easy matter to work too far to one side, and reach the mouth or stray under the scalp to distant points on the occiput. To avoid making such false passages one must first locate the junction of the vertebral column and axis, and only at that place should the perforator be introduced.

Occasionally in a labor complicated by pelvic contraction and unyielding soft structures, perforation of the after-coming head offers special difficulties, and attempts to puncture may fail because of inaccessibility. It then becomes necessary to make an external application of the cranioclast; that is, the inner, or first blade is forced into the canal made in the soft structures of the neck, the outer one covering the face. In this way a small head may be extracted. If this fails, the body will have to be severed from the head, when the cranioclast can be introduced through the foramen magnum or through a perforation made elsewhere on the head.

Very much oftener one experiences trouble in cranioclasia because of the difficulties accompanying the extraction itself. If the blades are not pushed high on the head, and only a part of the skull is held, they tear out, bringing away pieces of bone and scalp. This becomes very easy if the bones are loosely articulated. For example, the occipital bone can more easily be torn out than the bones of the face. In a macerated fetus, too, the bones become so loose that it is altogether im-

possible to get a secure hold with the cranioclast; and every time this happens the insecurity is increased, until, finally, it becomes difficult to find a part where it can be applied at all. If the edges of the broken bones are pointed and sharp, it is well to trim them off with bone nippers, for otherwise they may cut the mother's tissues.

### PROGNOSIS

The prognosis in perforation and cranioclasia rests upon the possibility of infection and the damage from maternal trauma. As far as infection is concerned, it is no more likely to occur than in forceps delivery, if the operation is done under as favorable circumstances; but, inasmuch as it seldom is, the procedure is accompanied by a much higher mortality. When done wholly in the interests of the mother, it is generally not undertaken before she has become exhausted and perhaps seriously injured.

As for trauma, it may occur from perforation, as well as from extraction, and be extensive in either case. The perforator may glance off the head and puncture the uterine wall; or it may be forced in a wrong direction. Thus may the bladder be opened and a vesicovaginal fistula result, jagged wounds of the cervix be inflicted, and numerous and varied wounds of the vagina caused, all through careless manipulation of the instrument. Such a thing as trephining into the anterior surface of the sacrum, instead of into the child's head, has been done. In cranioclasia, lacerations are produced in various ways: the mother's tissues may be included in the grasp of the blades; the instrument may slip or tear loose; the child may be extracted too rapidly and with too much force; and the birth canal may be cut into by the jagged ends of a broken bone.

Out of 232 cases of perforation in the Vienna clinic, the following number of important injuries occurred:

Complete rupture of the uterus	2 times
Complete rupture of the perineum	1 time
Lacerations of the cervix	11 times
Severe lacerations of the os uteri	6 times
Vesicovaginal fistula	1 time

Perforation and cranioclasia are procedures which may be, and oftentimes are, undertaken by the general practitioner. They are no more to be feared than a difficult forceps delivery, and require no greater skill.



## CHAPTER XI

### EMBRYOTOMY

In dismembering the child's body, in order to effect a delivery, a bisection is usually sufficient. If this division is made at the narrowest part, which is at the neck, it is spoken of as *decapitation*; if the body is severed at some point through the spinal column, it is called *spondylotomy*; if, instead of such a division, the viscera are removed to reduce the bulk of the fetal ovoid, and to make it more plastic, the procedure is referred to as *exenteration* or *evisceration*. Other mutilating operations seldom demand consideration.

### DECAPITATION

The severing of the child's head from its body is indicated (1) when the fetus becomes fixed in a transverse position, and (2) when mechanical difficulties make further mutilation of the body necessary after decapitation has been performed and before the fetus can be delivered.

When it is found impossible to convert a transverse position into a more favorable one, the child becomes impacted, the shoulder and its adjacent structures are forced into the pelvis, and an arm protrudes from the vulva (Fig. 130).

A marked change takes place coincidently in the musculature of the uterus. At the expense of the lower segment, the longitudinal fibers are drawn upward until the fundal portion gathers together all the driving powers of the organ, the child, after a time, coming to occupy a segment that has neither force nor resistance,—a state most favorable to rupture. It is in such conditions that the ring of Bandl may be demonstrated, its constricting band gripping and holding fast each gain in the struggle of expulsion. Accompanying this process, certain symptoms are to be noted.

Over the area of the contraction ring the abdomen grows exceedingly sensitive, the patient becomes uneasy, the pulse small and frequent, and, unless something is done to relieve the situation,—the uterus emptied,—rupture takes place, and the child is born into the abdominal cavity.

Another effect of impeded birth is, that the nutrition of the fetus becomes seriously interfered with, and death supervenes.



Fig. 130.—Shoulder presentation, with prolapse of the arm. Decapitation was necessary.

In the absence of relief, the temperature rises, gas accumulates in the cavity of the uterus, and the discharges grow foul. Immediate delivery is indicated, but on no account should version be undertaken. Rupture of the uterus would almost certainly follow the attempt. In less aggravated cases, the child being still alive, one may, with great caution, attempt to turn and de-

liver; but, even then, cesarean section might well be considered.

In moderate degrees of pelvic contraction, when one has elected to perforate and extract, but finds it difficult even then to deliver, decapitation becomes necessary in order to carry out the further procedures of dismemberment. In its compressed state, the head may be delivered only to find the shoulders caught at the superior strait; or the head, already delivered, will so interfere with the manipulations that decapitation must be done before the shoulder can be reached. Or, perhaps, the child's body itself, through distention of the thorax or abdomen with tumors or fluids, may be so large that further mutilation becomes necessary before delivery can be completed.

**Preliminary Conditions.**—Before undertaking so serious a procedure as decapitation, the following conditions must obtain:

(1) The fetus must be so deeply driven that the advancing part remains fixed within the superior strait. Only when this is the case can the operation be carried out without difficulty and without danger to the mother. An attempt to decapitate when the child lies high means that one must work far up within the uterus with instruments, and experience great difficulty in locating the head. Besides, there is increased danger of wounding the mother. Version under such circumstances would better be undertaken.

(2) The pelvis must not be impassable. A *conjugata vera* of 5.5 cm. would be a contraindication. Cesarean section offers the only means of delivery.

(3) The *os uteri* must admit the hand, which is nearly always possible, since embryotomy is seldom undertaken except in the expulsive stage of labor, when this requirement has been fulfilled. Should, however, the *os* still remain undilated, artificial methods for its further opening must be employed.

**Instruments Used.**—The key-hook of Braun (Fig. 131). This is a strong metal staff with an acutely bent hook at one end. It is provided with an auger handle large enough to be grasped firmly, and strong enough to stand any strain the hand can put upon it. The instrument is about 34 cm. long.

A pair of strong scissors (Fig. 132). Any strong scissors

curved on the flat and with blunt point will answer, but the Siebold scissors is especially designed for this work.

A perforator, Naegele or Smellie.

Besides the above instruments, it is well to have at hand a blunt hook, vaginal retractors and speculum, bone forceps, and an abortion forceps.

The usual preparations are observed. Narcosis is essential.



Fig. 131.—Braun's decapitation hook.



Fig. 132.—Siebold's decapitation scissors.

### **The Technic of Decapitation**

Decapitation can best be done with the Braun hook, and in the following manner:

The surgeon takes his place in front of the patient, who lies on her back with the knees drawn up and separated.

A sling is noosed over the prolapsed arm of the baby, and an assistant directed to make strong traction downward toward the side opposite the head. The operator now passes his hand into the vagina, and grasps the neck with the index and middle fingers behind and the thumb in front, the other two fingers lying along the back. Which hand is the one to be introduced can easily be determined by the short rule, that it is the opposite one to the hand prolapsed. Thus secured, the neck is drawn down with one hand, while with the other the hook is passed between it and the symphysis, the inner hand directing the instrument into position (Fig. 133). Upon making traction the vertebræ separate, and the neck comes down into the vagina. Then begins a pulling and twisting of the instrument, which soon tears its way through the integument. The tip of the hook should always be directed away from the birth canal toward the fetus while operating; otherwise much damage may be done the mother's parts. With the fingers clamped about the child's neck and overriding the crotch of the instrument, it is thus possible to follow the progress of decapitation (Fig. 134). As the vertebræ break and the ligaments give way, it can be felt, sometimes heard. Eight or ten turns of the handle generally suffices to sever the head from the body. The decapitated fetus is delivered by pulling on the arm which already protrudes from the vagina (Fig. 135). Very commonly the head remains above the superior strait, and must be immobilized by an assistant before any attempt is made to deliver it. Thus fixed, the operator passes his index finger into the mouth, hooks the thumb over the separated neck, and delivers, not forgetting the value of external pressure as an adjunct to traction (Fig. 136).

Instead of the Braun hook, a strong pair of scissors, like the Siebold shears, may be used. The neck of the child is grasped in the manner described above, the thumb directing the cutting, and by a series of small bites, severance is easily accomplished. The delivery of the body and afterwards of the head is as above described. For the general practitioner, the hook is the safer instrument to use, since with the scissors he can more easily wound the birth canal.



Fig. 133. Decapitation with the Braun hook. Introducing the hook.



Fig. 134.—Decapitation with the Braun hook. The instrument has been placed about the child's neck. By giving the handle a twist, first to one side and then to the other, the neck, after a few such movements, becomes separated from the body.

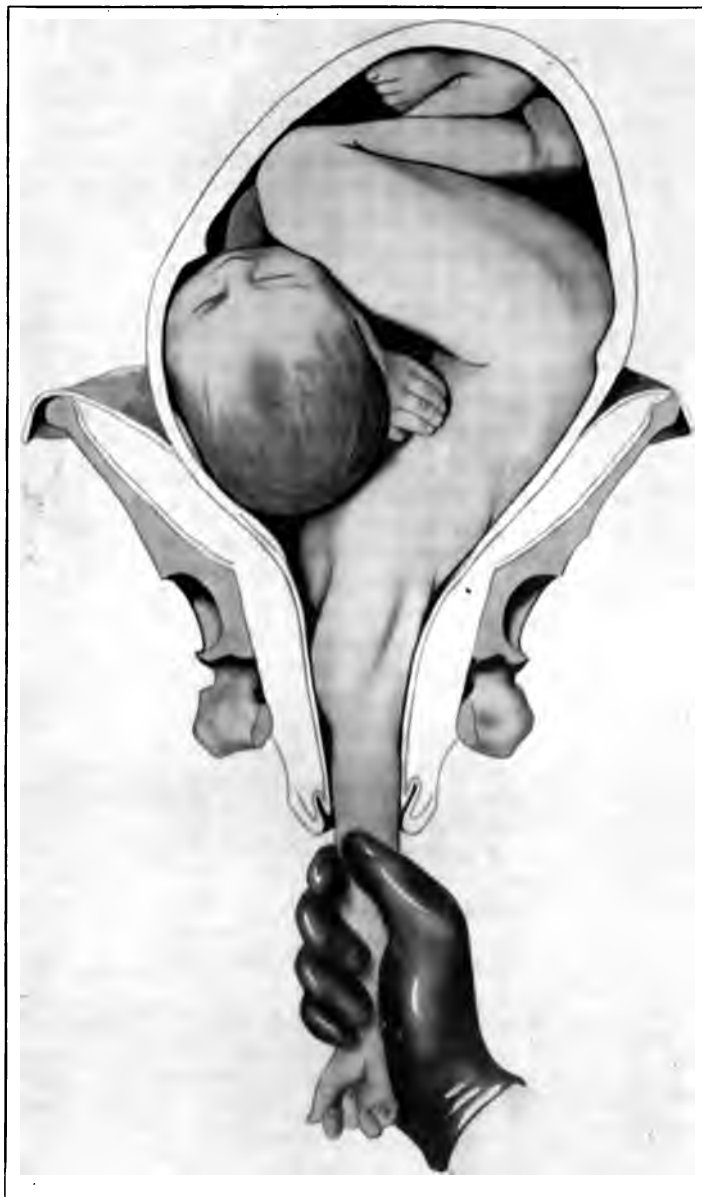


Fig. 135.—Following decapitation, the headless trunk of the child is delivered by making traction on the protruding arm.



Decapitation sometimes becomes necessary, even after the head has been delivered, in order to gain access to the fetus, which must be further mutilated before it can be delivered. The operation is easily performed with scissors. Before the headless trunk can be extracted it may be necessary first to take off one or both arms of the child. Not succeeding then, it may be com-



Fig. 136.—Manual extraction of the decapitated head. With the index finger in the child's mouth and the thumb fixed in the severed neck, which furnishes a means of applying traction, the operator's other hand makes pressure over the fundus of the uterus.

pleted by placing one blade of the cranioclast in the thorax of the fetus, the other over its back.

In a prolonged cross-birth the child comes to occupy a position that makes it exceedingly difficult, and even impossible, to reach the neck. The breast or back becomes arched forward,



**Fig. 137.** Evisceration. The impacted fetus lies in a position that makes the breast easily reached with the perforator. The protruding arm is drawn strongly downward and outward.

bringing the head and neck so close to the body and so far above the reach of the operator's fingers that other mutilating operations must take place before the uterus can be emptied. The consideration of such procedures follows.

### **SPONDYLOTOMY**

When the back becomes the most dependent part of the child's body, bisection may be made through the spine. This, too is best done with the Siebold scissors, which cuts its way through the viscera after having first severed the vertebral column. As an independent operation, spondylotomy will seldom be employed; but in connection with evisceration it often becomes necessary.

### **EXENTERATION**

Exenteration or evisceration aims to give flexibility and plasticity to the otherwise unyielding bulk of the fetus. In carrying out the operation, the Naegele perforator is driven into the child's body at its most accessible point; the instrument opened, closed, given a quarter-turn, and opened again. This makes an aperture large enough to admit two fingers (Fig. 137). Through this opening the contents of the cavity are pressed to one side and the diaphragm penetrated, a part of the operation which may not be easy of accomplishment without first removing the intestines. After this has been done, the spine becomes accessible and its resection comparatively easy. The collapsible fetus is delivered manually; or, if this becomes at all difficult, the child may be extracted with the blunt hook.

### **ATYPICAL CONDITIONS AND PROCEDURES**

The different forms of embryotomy become atypical whenever an abnormally strong development of a single part of the child's body occurs; and only under such circumstances, which are rare, will it be found necessary to depart from the methods described. Some of the more unusual obstacles that may arise are considered in the following paragraphs.

An abnormal width of the shoulders, so that delivery in the

general way becomes impossible, may require the use of the blunt hook. Failing to extract with this instrument, the next thing to do would be to sever both clavicles, allowing the shoulders to fall together.

An expanded thorax or distended abdomen, such as might come from an accumulation of fluid,—hydrothorax, ascites, tumors of the kidney, distention of the child's bladder,—may have to be evacuated before birth can take place.

When there are tumors to deal with, like the outgrowths in the region of the buttocks and neck, their removal by morcellation must be undertaken.

Double monsters and other teratomata sometimes demand every form of embryotomy before delivery can be effected. Twins, too, occasionally offer similar difficulties.

Decapitation, generally a simple operation, can present great difficulties if the neck remains so high that it can not be reached with the fingers and hook. Such cases are not well suited for embryotomy, but are best managed by version and extraction.

In dealing with a macerated fetus, it is sometimes difficult to separate the neck with the Braun hook. Scissors will be required because of the leathery character of the integument.

Another difficulty, the fetal posture, may be such that neither fingers nor instruments can be made to reach the neck; so that, instead of a decapitation, a spondylotomy or an exenteration must be performed.

While the decapitated head is usually brought away with little difficulty, it can cause considerable trouble if the mother's parts are much contracted. And should one find himself without a cranioclast, the forceps may be tried and as much pressure put upon the blades as they will stand, hoping thereby to express the brain substance. Another expedient worth remembering when other measures are not available and speedy delivery is not essential, is the application of moderate traction extending over a long period—a strong claw forceps fastened to the scalp, a cord attached, and a weight suspended. Finding this too slow, one may use the sharp hook, introduced into the skull through the foramen magnum, taking great care not to let it slip and wound the mother.

...solved in undertaking  
...does not interfere with  
...means of traction.  
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### RESULTS

...on the possibility  
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### DISCUSSION

...was seen in consultation on the  
...in the second transverse posi-  
...middle line between the umbilicus  
...and the sac ruptured, and  
...The mother's condition was fairly

...passed into the uterus; but, owing to the  
...this was accomplished with difficulty. In an  
...was brought down which proved to be the  
...A renewed effort to reach the foot

...to establish the belief that the child had perished,  
...of the uterus was greatly thinned out, and that the  
...Bandl's sign was sharply marked. The amniotic  
...and the uterus itself was contracted.

...was undertaken, but was soon aban-  
...beyond the constricting ring. It  
...This also failed. The shoulder was  
...the neck could not be reached with the  
...the Braun hook or the Siebold seis-  
...some was also unavailing.

...an automobile, the distance being  
...before reaching the city,  
...seven miles.

A necropsy revealed a rupture of the uterus, and sepsis.

**Comment.**—The efforts to deliver would have been carried to the limit had the resisting introitus been freely incised. This would have given room to perform exenteration, which, combined with spondylotomy, might have effected a delivery of a mutilated child in time to save the mother's life.

## CHAPTER XII

### CESAREAN SECTION

Cesarean section is an operation which makes it possible for the pregnant woman at or near term to be delivered through an incision made in the uterus. There are two operations designated as "cesarean," the abdominal and the vaginal, but only the former is thought of when discussing the subject in the abstract. The vaginal section is a modern procedure and has very different indications for its performance. It will be discussed under its own caption.

**Historic.**—For many centuries cesarean section as a post-mortem operation was practiced on those dying late in pregnancy. The early Romans went so far as to make it a punishable offense to bury a woman with her child undelivered. Many instances are on record of living children being taken from their dead mother's body in this way.

The first successful operation to be performed on a living woman is said to have been done in the year 1500. A Swiss swine-gelder by the name of Nufer, who, upon the failure of numerous midwives and several barbers to deliver his wife, seized the instrument most familiar to his hand, and opened her abdomen. It is quite unlikely that he did more than this, for we are told that she later bore him five other children in the usual way. Tarnier bears witness that the operation had not been successfully performed in Paris during his time, and a like statement was made the same year (1877) by Spaeth, of Vienna.

In 1876-77 Porro, of Pavia, reported several cases successfully delivered by abdominal section; but his operation included the removal of the uterus, as well as the fetus. While this was a step forward, the great stride came when Saenger, in 1882, published his method of suturing the uterus and leaving it in the closed abdomen. His operation was immediately adopted,

and still remains the classical procedure in all parts of the world.

In performing abdominal cesarean section, the uterus is incised through an opening made in the abdominal wall, and the child delivered wholly independent of the birth canal. There are several indications for its performance, the consideration of which follows.

### INDICATIONS

**The Contracted Pelvis.**—The subject of contracted pelvis as an indication for cesarean section will be considered from two points of view: first, as an absolute, and, second, as a relative, indication. In the one case the contraction of the pelvis may be so great that delivery of a normal child through it can not take place, even after embryotomy has been performed; in the other and lesser degree of contraction, a mutilated child might so be delivered.

The different forms of contracted pelvis have different degrees of passability, the slight variations depending on the peculiar character of the deformity. Thus a flat pelvis, having a true conjugate of 5.5 cm., would be absolutely impassable, while the symmetrical generally contracted pelvis would be equally impassable, although the same diameter measured half a centimeter more. Such distinctions, however, are too fine to be really practical. The symmetrical pelvis, the oblique pelvis, the pelvis contracted by the presence of bony tumors, the laterally contracted pelvis—in short, any pelvis whose configuration reduces one of its diameters to the above degree, must be looked upon as an *absolute indication* for the performance of abdominal cesarean section. Of the osteomalacic pelvis, it is interesting to note that, while seemingly impassable, it may, because of its peculiar plasticity, yield to the forces of labor, and allow the child to pass. The funnel-shaped pelvis and the kyphotic pelvis make delivery impossible only when the distance between the ischial tuberosities is reduced to 5.5 cm. (Compare with the chapter on Pelvic Contractions.)

A pelvis whose conjugata vera measures 5.5 cm. to 7 cm. precludes the birth of a full-term fetus intact; it does not prevent



its delivery in mutilation. Such a contraction is termed a *relative indication* for cesarean section. If one has to deal with a pelvis whose true conjugate measures 7 cm. or, perhaps, 7.5 cm., and it is evident from the diagnosis, as well as from the history of former pregnancies, that natural birth can not take place, cesarean section would still be indicated as the most helpful means of getting a live child. There are, however, other procedures in these borderline cases which have been practiced with some success, namely, pubiotomy, symphyseotomy, and the induction of premature labor.

**Anomalies of the Soft Parts.**—In like degree anomalies of the soft parts may obstruct the birth canal and make delivery by the natural route quite as impossible as will contractions of the bony structures. If, for example, there should be a severe scar formation in the cervix or vagina, particularly the superficial deformities of these parts, such as may come from diphtheritic processes, from puerperal inflammations, and from certain gynecologic operations, vaginal delivery becomes impracticable, and abdominal cesarean section furnishes the only outlet. (See chapter on Anomalies.)

In like manner the canal may become closed by new formations. Carcinoma of the vagina, as an illustration, may completely occlude it, and make delivery by this route out of the question. Growths, benign as well as malign, in the cervix and portio vaginalis operate in the same way. And, furthermore, it is possible for such formations to obstruct the way quite as effectually by protruding themselves into the pelvis, though they may be outgrowths from the ovary, rectum, bladder, or of the outer wall of the lower segment of the uterus. (See chapter on Genital Tumors.)

In rare cases the topography of the genital canal may be so altered through gynecologic procedures, such as ventral fixation of the uterus, that cesarean section must be considered. (See chapter on Anomalies.)

**Closed and Undilatable Cervix.**—This would be an indication only when conditions demanded immediate delivery, as might obtain in eclampsia, which, coming on at term or at the begin-

ning of labor, requires the rapid emptying of the uterus. Cesarean section, under these circumstances, is one of the recommended procedures. The abdominal route is the choice of many obstetricians, but more recently the vaginal section is well thought of and may be undertaken if no contraindication, such as pelvic contraction, exists. (See Vaginal Cesarean Section, page 278.)

**Sudden Death of the Mother Late in Pregnancy or at the Beginning of Labor; the Child Living and Viable.**—It is a well-established fact that a pregnant woman dying suddenly in labor or near the end of pregnancy, is survived by her unborn child for some minutes. The more acute the death, the longer will the unborn child live; and, conversely, the more chronic the final illness, the earlier will it perish, perhaps dying before the mother. In any event, if the mother dies with the child alive in the uterus, the cesarean section, if rapidly performed, may save it.

The following case is reported by Dr. Alonzo E. Mack, of Omaha:

A woman in her fourth pregnancy, afflicted with varicosities of the leg, was to be confined on October 11. On the morning of the fourth, her husband telephoned that she had fainted, requesting the physician's immediate presence. Dr. Mack says, "About fifteen minutes later, when I arrived at the house, I found the patient dead. Believing that not more than three to five minutes had elapsed, I advised the immediate opening of the abdomen and the uterus. Her husband gave his consent and without waiting time to listen for fetal heart sounds, and knowing positively that the woman was dead, I incised the abdomen and the uterus with a small lance, quickly removed the child, and clamped and divided the cord. To my dismay the child showed no signs of life. I listened with the stethoscope for heart sounds, but heard none; the baby to all appearances was dead. In hopes there might be life, I began artificial respiration, at the same time dipping the baby alternately in hot and cold water. I also used the Schultze method of resuscitation. For forty minutes these measures were kept up without the slightest indication of life. It then occurred to me to try epinephrine, but after filling my hypodermic with a 1:1000 solution, I was puzzled to know where to inject it. I finally introduced it into the cord, carrying the point of the needle well through the abdominal wall. In about two minutes the cord began to beat, and the pulsations of the heart could be seen and felt. Artificial respiration was continued; also the tubing. At the end of fifty minutes from the time the child was delivered, it was breathing well, and crying lustily. Seven months later the baby weighed nineteen pounds. (Jour. Am. Med. Assn., Aug. 28, 1915.)

### CONDITIONS

**Surgical Ability.**—Cesarean section is a laparotomy, and as such demands the same exacting surgical technic; and, since there may arise in the course of the procedure complications that call for skill not likely to be possessed by other than a competent obstetrician, the operation should be performed only by one who has had surgical training. Only when there is immediate and imperative demand for the operation should it be undertaken by the general practitioner.

**Hospital Facilities.**—For the same reason cesarean section should be performed in a hospital, for only there can the preparation of instruments and dressings be supervised with the necessary degree of care; and in the hospital the light is good, and ample assistance is to be found. So that, whenever a hospital is available, the patient should be taken there; and only when the exigencies of the case make an immediate operation imperative is one justified in performing it elsewhere.

**Birth Canal.**—In opening the uterus it is impossible not to spill some of its fluid contents into the abdomen, and should the discharge contain harmful microorganisms there is danger, not only of infecting the wound itself, but of causing peritonitis. Obviously, then, it is essential to success that the birth canal be as free as possible from infection. If there is any suspicion of sepsis; if the sac is a long time ruptured; if the pulse has become rapid and the temperature elevated, the cesarean section as a relative indication should not be undertaken.

**Viability of the Child.**—The rule that the child must be alive and viable holds good only when cesarean section becomes a relative indication. If absolute, there is no alternative; the operation must be done, even if the child be dead, since no other way of delivery is within one's power. In the relative indication, the child being dead, perforation and cranioclasia are proper procedures. Also in the case of a living child, if it can be established beyond a reasonable doubt that it is not viable, as, for example, in hydrocephalus, the child should be delivered in this way rather than subject the mother to the more serious risk

of abdominal section. One should also make sure that he is not dealing with twins, for their discovery after the incision is made, reflects discredit on the diagnostic skill of the obstetrician, to say the least. The following instance depicts such a case: A woman with a moderate degree of pelvic contraction lost her first three babies at the time of their birth, version and extraction being performed in each instance. In her fourth pregnancy it was decided that she should undergo cesarean section. Upon opening the uterus it was found that there were two children, neither of which was too large to be born naturally.

### PREPARATION

The best time to operate is after labor has begun, for, undoubtedly, there is an advantage in the natural and spontaneous onset of rhythmical uterine contraction. And more than this: if labor has continued for some time, the dilatation effected in the cervix favors postoperative drainage. It is, however, desirable to have the sac intact, since infection is then less likely to occur. In case it has ruptured there should be as little delay as possible in performing the operation.

**In the Hospital.**—Just preceding the operation, the pubes and linea alba should be shaved, and the skin over the abdomen scrubbed with soap and water, followed first by alcohol and then by a sublimate solution. In emergency, the scrubbing may be replaced by the simpler and quicker method of painting the surface with a ten per cent tincture of iodine, in which case the skin should be kept dry.

The bladder should be catheterized. This is a part of the preparation often overlooked in the haste and excitement incident to the operation.

The area about the field of operation should be protected by sterile towels, or, still better, by the laparotomy sheet.

The operator needs three assistants, one to stand at the opposite side of the table, another to make pressure over the broad ligaments and aid in the fixation of the uterus, and another to handle the instruments. One other skilled person,

preferably an obstetrician, is required to look after the baby, performing such resuscitative measures as may be indicated. And, of course, there is the anesthetist.

The instruments are few: A scalpel or two, tissue forceps, artery forceps, two fixation forceps, several pairs of scissors (straight and curved), abdominal retractors, needle-holder, and needles. The fixation forceps referred to is a double toothed vulsellum for grasping the incision at the angle of the wound and upon which moderate traction is made while the first few stitches are being placed.

For suture material, ten-day catgut of small size has proved satisfactory; but there is no objection to the use of silk. Indeed, some surgeons prefer it, and condemn absorbable material. Silk-worm-gut or metal clips may be used to bring the skin together.

The instruments are boiled for at least five minutes in a soda solution, and then conveniently arranged on an instrument table.

An autoclave drum with its sterile dressings is placed within easy reach of the surgeon.

It goes without saying that the operator and his assistants should be thoroughly sterilized, properly gowned, gloved, and masked (Fig. 138).

For the use of the one whose duty it is to look after the baby there should be provided tubs of hot and cold water, a pulmotor or lungmotor, a tracheal catheter, and such other devices as may be required, in case of necessity, to resuscitate the baby.

**In the Home.**—In the private house all preparations and procedures should be as near like the foregoing as possible. For an operating table, the table found in every kitchen will answer the purpose. This is covered with several thicknesses of blanket over which is laid a clean sheet. One must have two assistants in order to undertake the operation with any degree of safety, one to stand opposite the operator, the other to administer the anesthetic. Before beginning the operation, a dozen or more needles should be threaded so that no time need be lost in threading and reaching for them after the operation is once begun. In case one does not have with him sterile towels, dressings, and sponges, other things about the house, such as handkerchiefs, diapers, and hand towels must be borrowed for the occasion.



Fig. 138. Surgeon prepared for operation. (DeLee.)

These should be thoroughly washed and boiled before using. A table for the instruments and dressings is covered with a clean sheet, and placed within easy reach of the operator. Instead of spreading the instruments out on it, it is better to keep them in a solution of lysol to which they are returned from time to time as they are used. After painting the abdomen with a ten per cent tincture of iodine, the field of operation is surrounded with towels wrung out of lysol solution.

In making the cesarean section, one chooses between a conservative and a radical operation. The one contemplates leaving the uterus capable of further gestation, the other leaves the mother unproductive.

### THE CONSERVATIVE OPERATIONS

**Corporeal Hysterotomy.**—An incision of about 16 cm. in length is made in the median line, extending as far above as below the umbilicus. (Fig. 139.) The integument and underlying fat are cut through, down to and onto the fascia. All bleeding vessels are clamped and, if spurting, ligated. The fascia is now divided the full length of the incision, and the recti muscles exposed and separated by blunt dissection.

Just a word may be interpolated here concerning the abdominal wall, which has undergone considerable change during pregnancy. At term it is much attenuated, the fat has largely disappeared, and the recti muscles are often separated. So, in making the incision, the scalpel comes down upon the peritoneum and uterus surprisingly quickly. No particular harm comes from entering the peritoneal cavity thus easily, for there is little chance of the intestines being in the way; however, it is recommended that one proceed with caution.

A fold of the peritoneum is now picked up on each side with tissue forceps, and nicked open with the scalpel. The index finger is then introduced into the opening, and swept around to make sure no adhesions are present, and to free them, if there are any. Following this preliminary, the peritoneum is cut the full length of the skin incision under the guidance of the index and middle fingers, whereupon the deep blue-red uterus lies

exposed to view. A generous piece of sterile gauze, rolled for convenience in handling, is wrung out of hot saline solution and packed between the abdomen and the uterus all the way round. This attempts to do two things: dam off the postperitoneal cavity and hold back the intestines. It sometimes does neither. An assistant, with the hands applied to the abdomen, can make pressure quite as effectively. After the peritoneum has been opened, one should

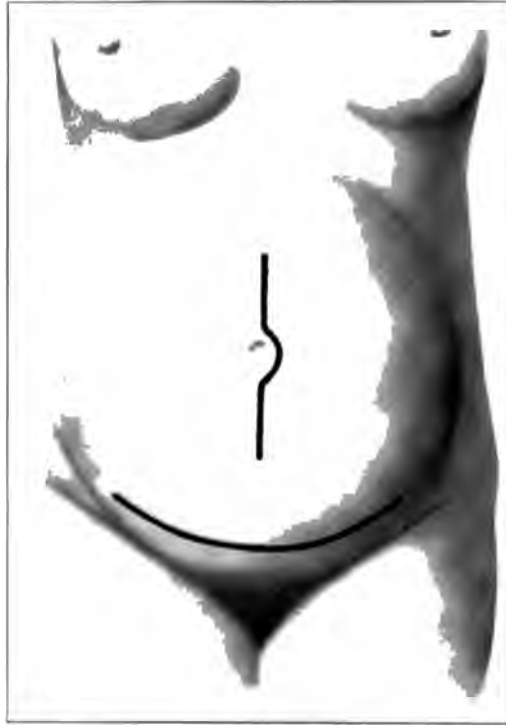


Fig. 139.—Cesarean section. The median and transverse incisions.

halt long enough to fasten with skin clamps a sterile towel over the margin of the wound on both sides. This gives greater protection to the abdominal cavity.

Up to this point the surgeon may operate with considerable deliberation; but the next few steps of the procedure require dexterity, quick perception, and cool and collected judgment. After the knife enters the tissues of the uterus there is a tendency to



stop and consider; one must act, and act quickly. Within a space of time less than one minute the uterus should be opened and the child extracted.

Beginning at the fundus, the uterus is incised in its midline downward for a distance of about 12 cm. (Fig. 140). While the opening should be made rapidly, it must not be made so violently as to wound the child. As compared with the resistance of the integument, the uterus is opened with one-half the force.

If the placenta has a lateral attachment, it is more than likely that the amnion will be cut through at some point inadvertently with the scalpel. This does no harm, for it must be opened anyway. When it is opened, the amniotic fluid wells from the opening and some portion of the fetus, usually the thigh, presents. the incision may be continued with the knife, but the scissors is safer. The index and middle fingers are passed between the child and the membranes as a guide, and the full 12 cm. laid open.

If, instead of the amnion, the placenta lies beneath the incision, a condition that is much more troublesome because of the increased hemorrhage, it should be separated from the uterine wall with the fingers until the free border is reached, from which point one proceeds as above.

After the child has been lifted out, the uterus is immediately grasped with both hands, and held firmly until the cord can be clamped and severed. Undue haste should be avoided, since neither mother nor child is in much danger. Usually, the placenta detaches itself as in normal birth; but in case it does not, it must be loosened manually. No attempt is made to stop hemorrhage altogether, but there are ways of holding it well within the bounds of safety. One therapeutic measure recommended is the use of pituitary extract, 1 c.c. of which is injected hypodermatically just preceding the initial incision. But the most reliable hemostasis is mechanical, applied by an assistant who holds the broad ligaments with the hands, or compresses them through the abdominal wall.

As soon as the placenta has been delivered, a claw forceps fixed in each angle of the wound, and held securely by an assistant, immobilizes the uterus, effectually closes the sinuses, and

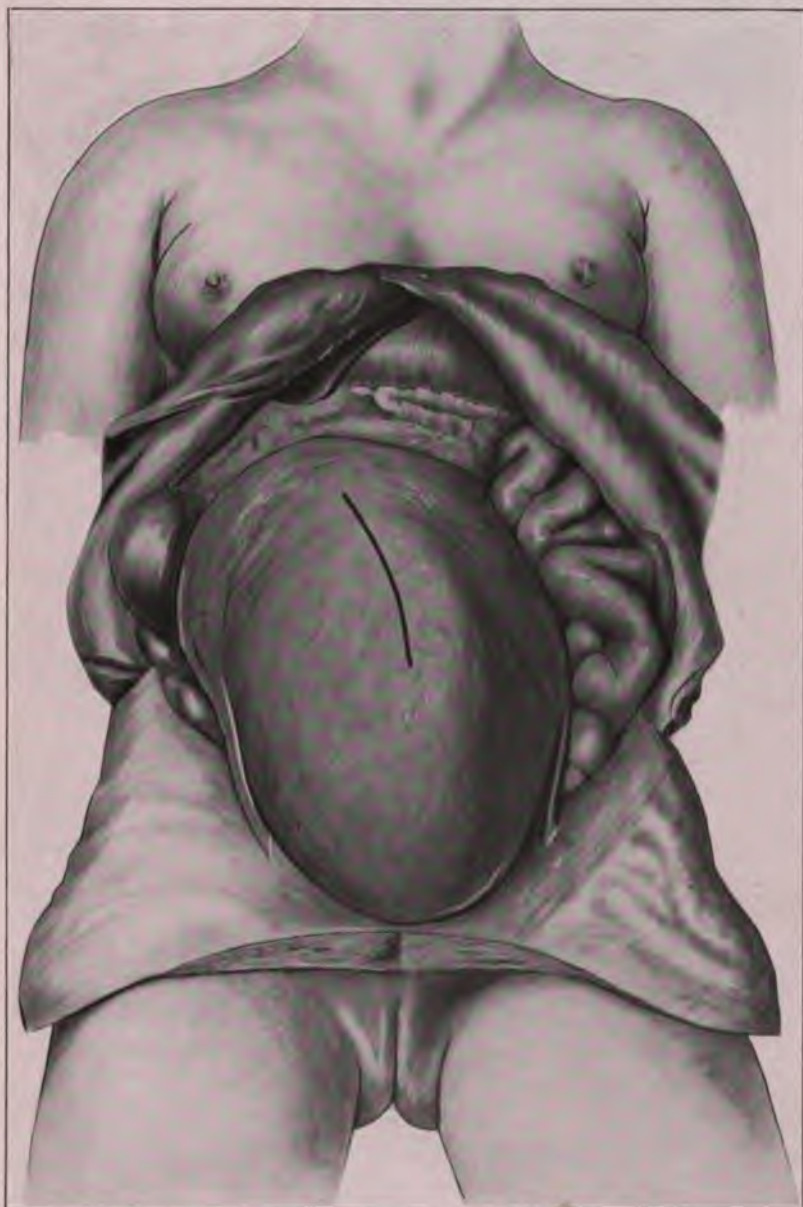


Fig. 140.—Topography of the uterus at the end of pregnancy. Median incision shown.

exposes the surfaces to be sutured. Coaptation of the muscle wall should be by interrupted rather than by continuous suture. It takes a little longer to do it this way, but the closure is more dependable. Beginning at the fundal end of the incision, a curved nonecutting needle carrying ten-day catgut of small size, or, if preferred, silk or linen, is made to enter just beneath the serous



Fig. 141.—Cesarean section. Interrupted (muscular) and continuous (serous) suturing of the uterine incision.

surface. As much muscle as may be encompassed by the curve of the needle is included, but none of the mucosa. Coming out below the mucous membrane, the needle is reintroduced at a corresponding point on the opposite side, a similar bite of the muscularis is taken and the needle is brought out just under the serosa (Fig. 141). Ten or twelve such stitches will be needed. The serous margins are finally brought together with a running suture of ten-day gut.

After closing the uterus the gauze pack is removed, the abdominal cavity flushed with saline solution, or carefully sponged out with gauze, and the belly closed. Unavoidably, some of the amniotic fluid and blood will get into the cavity, and, since it is impossible to get it all out, only as much as

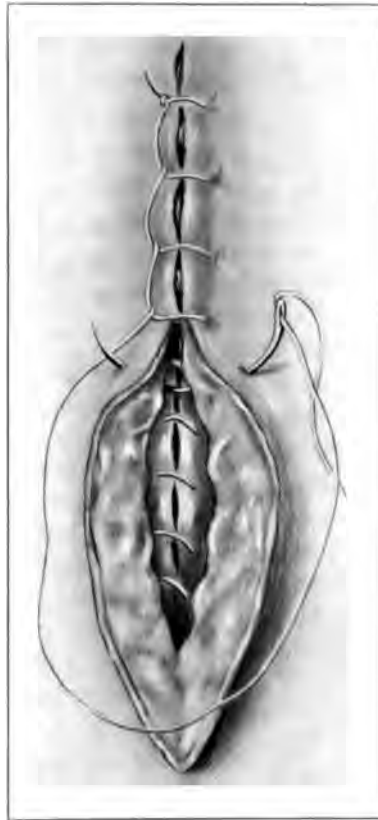


Fig. 142.—Closing the abdominal incision.

can be removed easily and without manipulation is attempted. If it is innocuous, it will do no harm; if infectious, peritonitis will follow.

The usual way of closing the abdomen (Fig. 142) in layers is to bring the edges of the peritoneum together with a running suture of catgut. The fascia also may be u e

way; but a series of interrupted mattress sutures gives greater security. (Figs. 143 and 144.) If the layer of fat is thick, it,

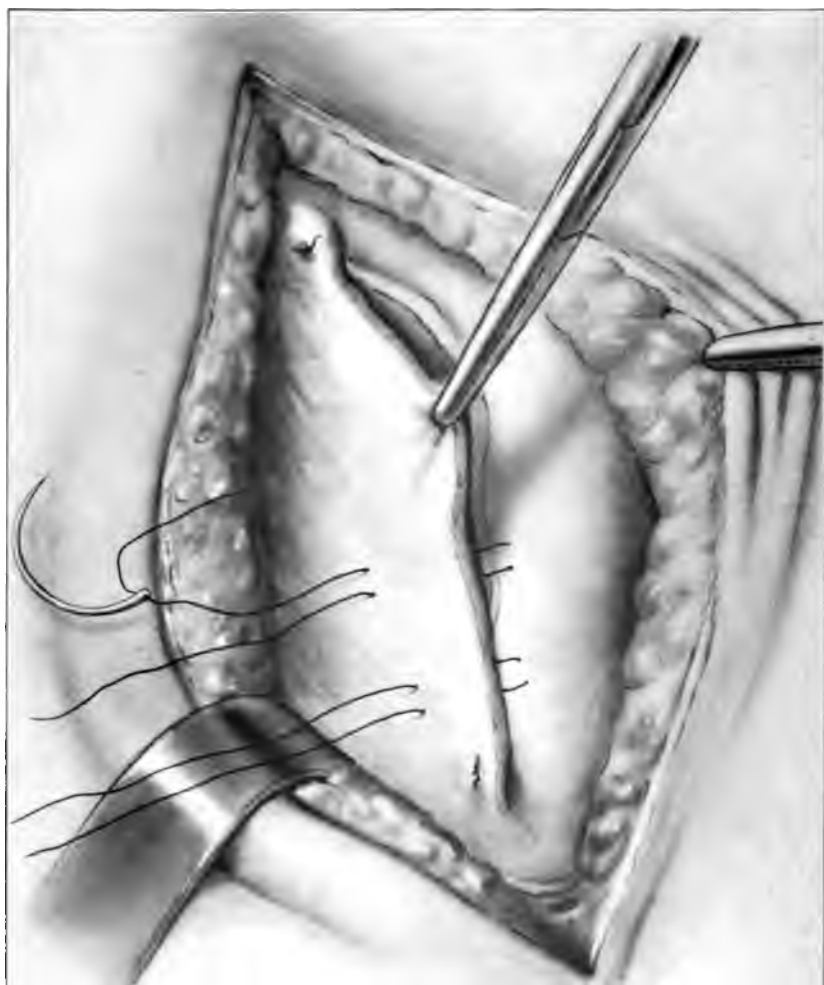


Fig. 143.—Overlaying the free aponeurosis of the skin with the fat. Method of applying the mattress suture. (Am. J. S.)

too, should be brought together before closing the skin, especially if the subcutaneous suture or the Michel's clip (Fig. 145)



is to be used; otherwise the thick structures between the fascia and skin tend to fall apart. The wound is dressed in the usual

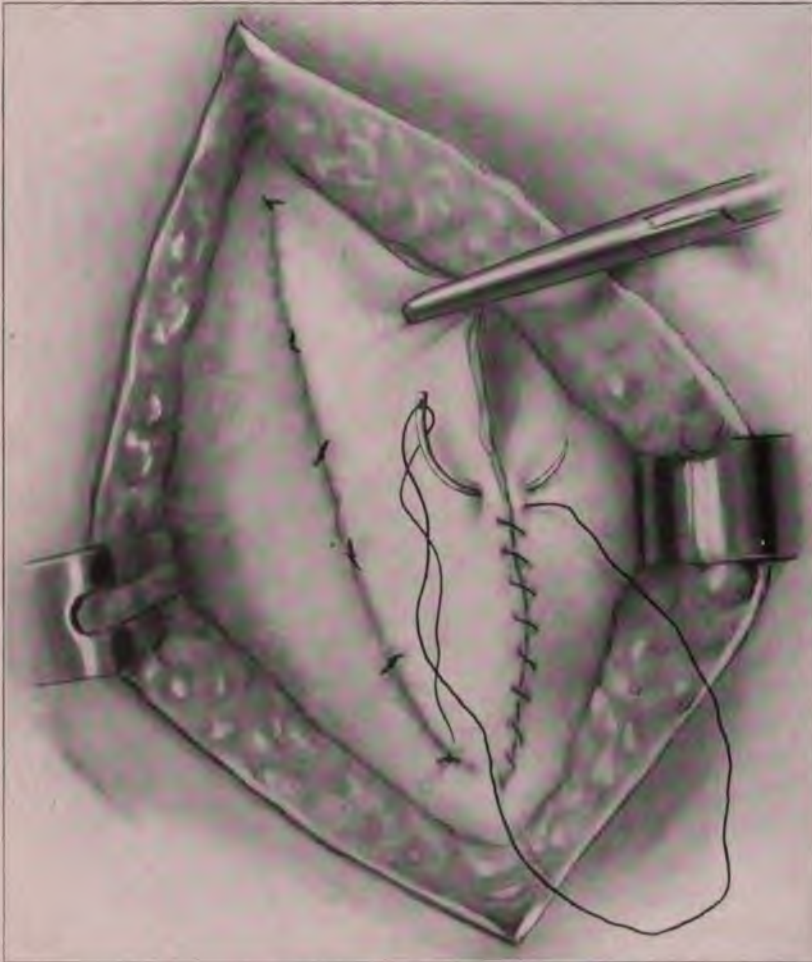


Fig. 144.—Approximating the peritoneal surface of one flap to the aponeurosis of the other, and suturing its free edge thereto. (After Judd.)

way,—a light dressing held in place by a binder or by adhesive strips.

Some obstetricians prefer the extraabdominal to the intraabdominal section of the uterus. Its advantages are that it gives

the operator a wider latitude in making his incision, and hemorrhage can better be controlled. But to bring the pregnant uterus outside the body requires a much greater wound in the abdomen, and involves fully as much danger of infecting the peritoneum.

**Suprasympyseal Hysterotomy.**—With a slight upward curve a transverse incision about 15 cm. long is made just above the symphysis, going through the skin and superficial fat down to the aponeurosis (Fig. 146). Bleeding arteries are clamped and ligated. The fascia is then opened, and separated from the underlying muscle for several inches both above and below (Fig. 147); and, in order to gain a better view of the field, it is folded



Fig. 145.—Applying the Michel metal clips.

back and fastened; the upper leaf with a single stitch to the skin below the umbilicus, the lower to the integument of the pubes. Obviously this is but temporary. The recti muscles now are separated in the middle line, and pulled to the side with retractors. This exposes the peritoneum. (Fig. 148.)

At a point about one inch above the bladder, the peritoneum is picked up with pincettes, and divided transversely the full length of the wound. The retractors, already engaged in holding the recti muscles apart, are made to include the divided peritoneum, and the section is widely opened. The uterus, which now shows plainly, is incised transversely, going only deep enough to include the loosely attached serous membrane.

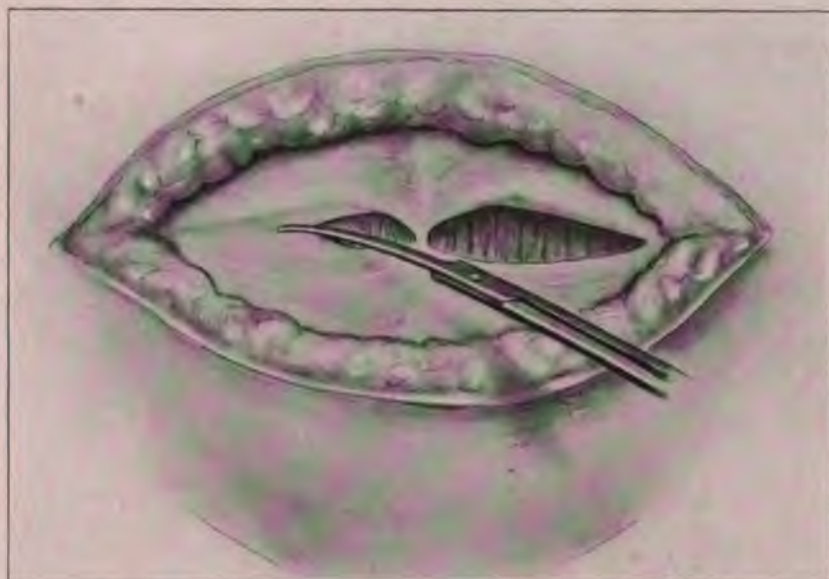


Fig. 146.—Transverse abdominal incision. Incising the fascial layer.



Fig. 147.—Transverse abdominal incision. Blunt separation of the fascia from the underlying muscle; its median attachment is severed with scissors. (After Krönig.)



The upper portion of this divided structure is carefully detached from the wall of the uterus, folded back, and stitched to the margin of the parietal peritoneum with eight or ten interrupted sutures half an inch or so apart. This practically shuts off the peritoneal cavity, so that amniotic fluid and blood have little chance of getting in when the uterus is opened. The lower portion of the serosa is pushed back with gauze until the whole lower segment of the uterus lies uncovered (Fig. 149).

The therapeutic effect of pituitary extract should not be lost sight of. Its use is quite as important in this operation as in the other, and it should be given at the time the subserous surface of the uterus has been prepared for incision.

Everything in readiness, an incision 10 to 12 cm. long is made lengthwise of the uterus. (All cutting thus far has been in a transverse direction; the recti muscles were separated, not cut.) If an extremity presents, it is grasped and the child extracted; if the head presents, its expulsion can be accomplished by lateral pressure. The delivery of the placenta differs very little from that of natural birth. If it does not come away of itself, it may be expressed or removed manually.

In closing the uterus, the divided muscle is brought together with interrupted catgut, silk, or linen, over which is run a suture of continuous catgut. The reflected serosa is then freed from the parietal peritoneum to which it was fastened when the space of Retzius was opened, and stitched by a continuous suture to the portion below. Then follows the reuniting of the parietal peritoneum, the fastening together of the recti muscles, the suturing of the fascia, the approximation of fat, and, finally, the suturing of the skin. The wound is dressed with a light binder.

If one could know absolutely that the contents of the uterus were innocuous, one's fears of peritoneal infection following section would be greatly allayed. But more and more, as experience ripens, are we disinclined to chance contamination with any of its fluids or discharges, for it is impossible to have more than a reasonable assurance that no harmful microorganisms have already found lodgment therein. Obstetricians have sought to discover a way by which the uterus can be opened and emptied abdominally, without invading the general peritoneal cavity;

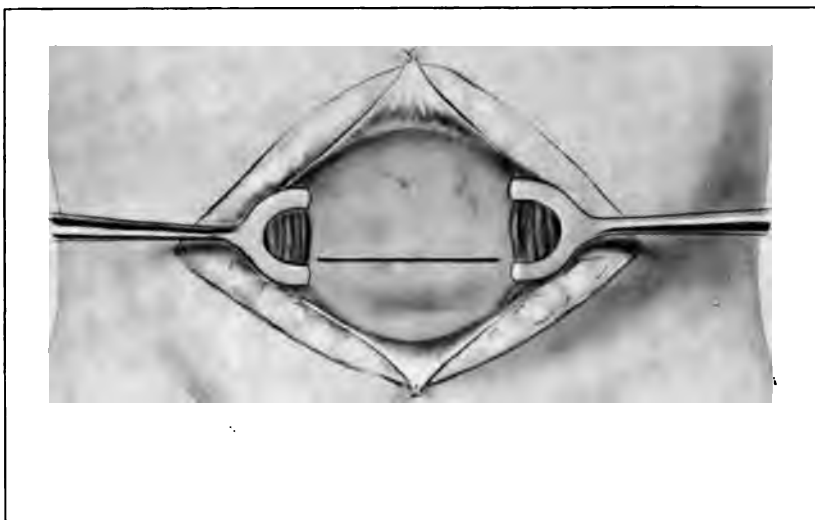


Fig. 148.--Suprasymphecal cesarean section. The integument and fascia have been incised, and the recti muscles retracted. The fascia has temporarily been sutured to the skin, both above and below. The parietal peritoneum is exposed, a penline showing where it is to be opened. Just above the symphysis can be seen the slightly bulging bladder.

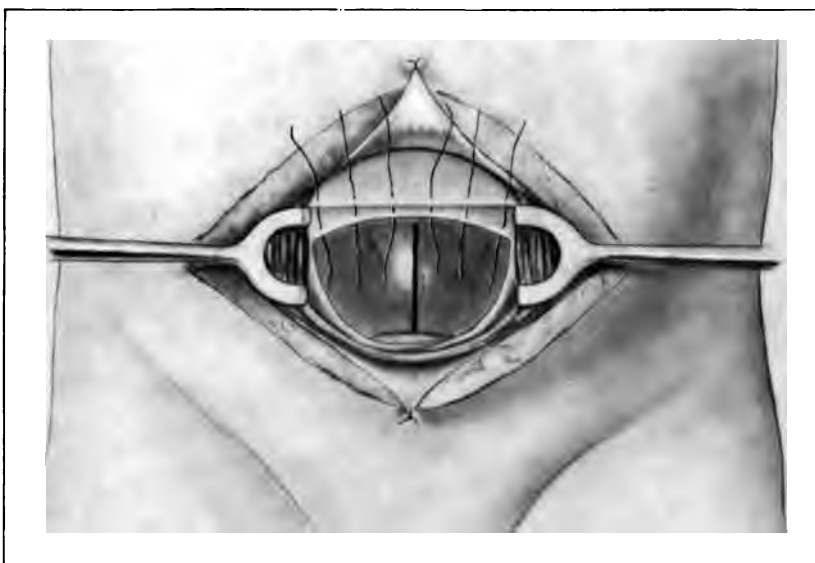


Fig. 149. Suprasymphecal cesarean section. The parietal peritoneum has been opened transversely; the uterine peritoneum has been incised, and separated from the uterus. The upper margin of this serous layer is shown with sutures in place, uniting it to the parietal peritoneum. The interrupted suture is shown in the drawing, but a continuous suture may be used if preferred. The loose peritoneum below, together with the bladder, is pushed toward the symphysis and away from the uterus, in order that as much space as possible may be gained for the incision to be made in the lower segment of the uterus. If more space is required, the bladder may be separated from the uterus as shown in Fig. 150. (After Hammerschlag.)

and, while the so-called extraperitoneal cesarean section, to be described later, theoretically accomplishes the purpose, it seldom does in reality. The suprasymphyseal hysterotomy, while not theoretically extraperitoneal, practically is as far as the opera-

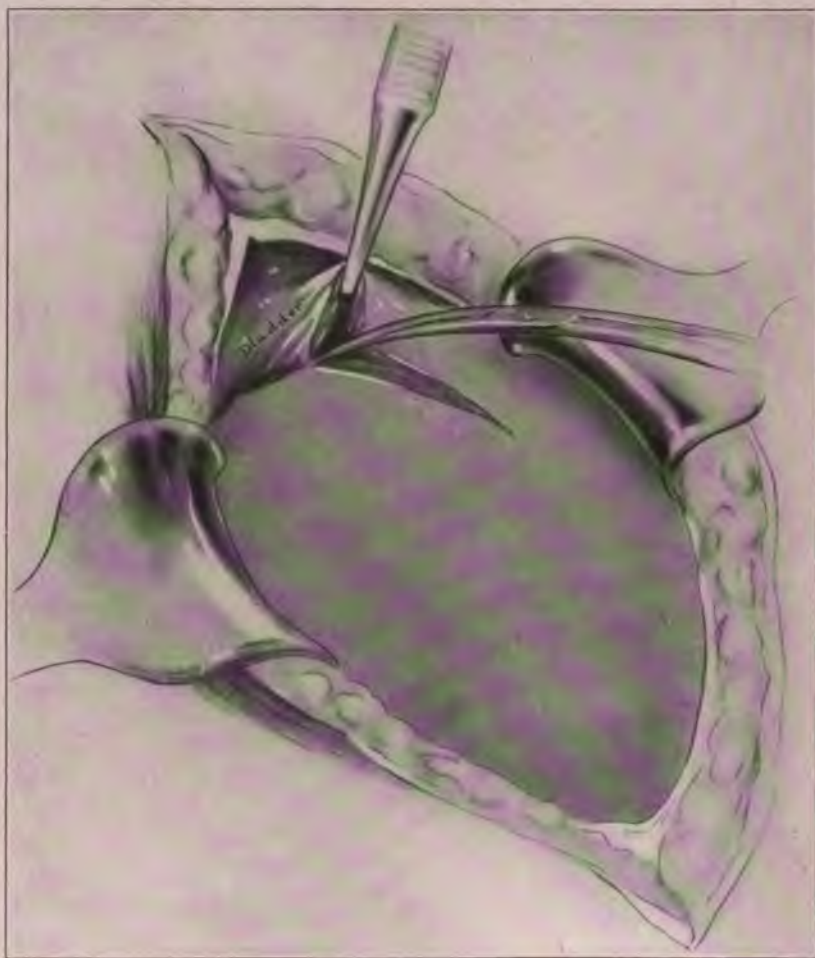


Fig. 150.—Transperitoneal cervical cesarean section. Separating the bladder from the uterus.

tion, *per se*, is concerned. But it does not remain so; the incision is exposed as in the classical section. Döderlein goes a step further, and opens the uterus through the isthmus of the cervix,

which is afterwards covered over with the detached bladder. A short description of his operation follows:

**Transperitoneal Cervical Section.**—After opening the abdomen either by median or transverse incision, the vesicouterine fold



Fig. 151.—Opening the uterus.

is followed down to its attachment, incised at its junction with the uterus, and separated from the isthmus of the cervix for nearly its whole length (Fig. 150). The separation is accomplished partly by sharp and partly by blunt dissection, care be-



ing used not to penetrate the bladder. The loosened bladder is then retracted toward the symphysis, and the uterus opened in the middle line through the denuded isthmus. The section must be large enough to permit of easy delivery. (Fig. 151.)

If the child presents by a foot or the breech, it is extracted; if by the head, the operator locates the baby's face, and with

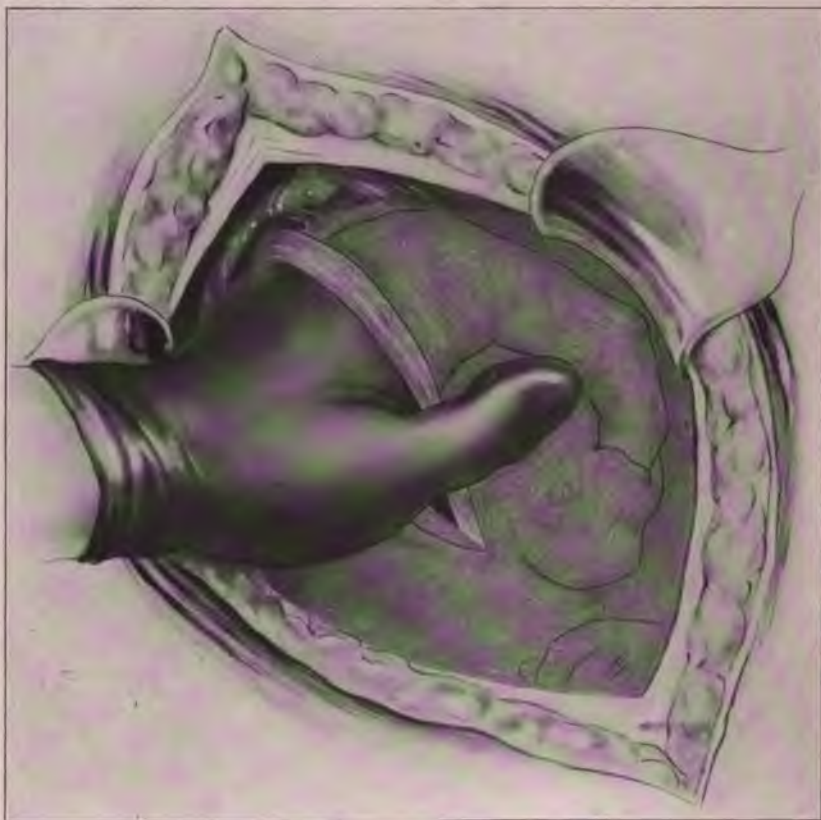


Fig. 152.—Bringing the child's face into the uterine opening.

his finger in its mouth rotates the head into a posterior occipital position, bringing the face into the incision (Fig. 152). This accomplished, an assistant, with his finger replacing that of the operator, fixes the head in position while the forceps is being applied. In introducing the blades, the right is passed to the left side of the

face, the left to the right, that is, in the reverse order of their vaginal use. This brings their pelvic curve toward the symphysis (Fig. 153). With light traction the head is readily delivered, and the body follows without difficulty. Placental delivery is even easier than in normal birth.

Hemorrhage is controlled by suturing. The first stitch placed



Fig. 153.—The face of the child has been brought into the opening, and is held there until the forceps is applied.

at the upper angle of the wound is tied, and handed to an assistant who makes sufficient traction on it to fix the uterus. Incidentally, the traction closes the bleeding vessels. One layer of interrupted sutures (preferably formalized catgut), followed

by a running suture of the same material, effectually closes the uterus (Fig. 154). The bladder, which has meanwhile been held out of the way with a retractor, is now dropped into place and sutured to the uterus, completely overlying the cervical wound and isolating it from the peritoneal cavity (Fig. 155). The material for uniting the bladder wall to the cervix should be of fine silk, five or six interrupted sutures of which are employed. The advantage of this operation over the classic cesarean section is, that the uterine wound in the earlier days of the puerperium is shut off from the general abdominal cavity by the imbricated

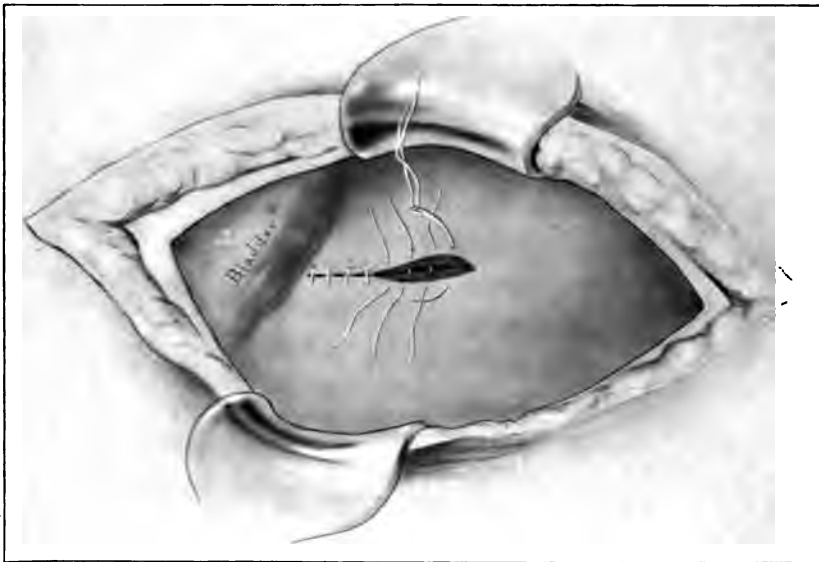


Fig. 154. — Suturing the uterine wound.

bladder. Since serous surfaces become quickly adherent, it is likely that, as far as exudates from the uterus are concerned, there is now little danger. König reports having performed the operation sixteen times without a maternal death.

**Extraperitoneal Section.**—Suprasymphyseal cesarean section with a few modifications, may be made entirely extraperitoneal. Up to the point of opening the peritoneum the two operations are identical, except that the bladder, instead of being emptied, is distended with fluid. Through the pubovesical space of Ret-

zius the peritoneum (unopened) is pushed away from the rectus muscle, and is loosened by blunt dissection from off the bladder. Working toward the left side, the vesicouterine fold of peritoneum is stripped upward from the lower segment of the uterus; and the bladder and detached peritoneum are drawn toward the right side with a broad retractor. In order to obtain sufficient room it is generally necessary to sever the left lateral ligament

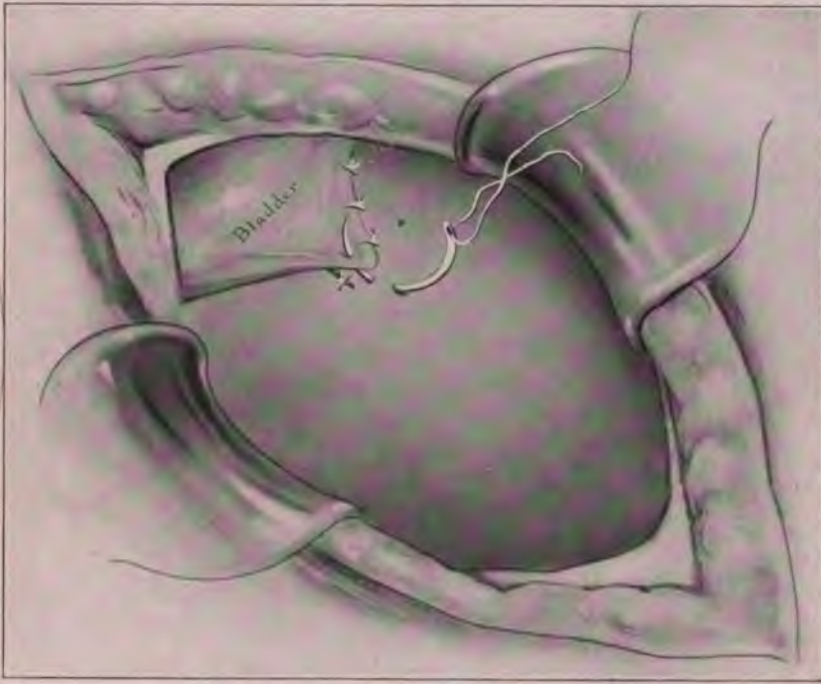


Fig. 155.—The detached bladder is being replaced over the wound in the uterus. (The foregoing series of pictures illustrating the steps of the transperitoneal cervical cesarean section are redrawn from Döderlein and Krönig's *Operative Gynecology*.)

of the bladder. Through this exposure the uterus is opened as in the suprasymphyseal operation. Delivery and repair also are the same. (Latzko.)

The extraperitoneal operation is recommended only when the lower segment of the uterus has become much attenuated by labor, the patient subjected to extensive exploration and manipulation, and the amniotic fluid drained away; and not then if actual



sepsis is present. Should there be sepsis, the uterus may be opened and drained after the method of Rubeska-Sellheim, which is one of provisional fistula. The abdomen is opened above the symphysis; and the parietal peritoneum, together with a reflection of the uterine serosa, is sewed to the skin margin. The union of these tissues shuts off the peritoneal cavity, leaving only the uterus exposed in its lower portion, which in due time is opened and emptied. Secondary suturing of the organ and abdominal wall is carried out later.

### THE CONSERVATIVE OPERATIONS COMPARED

Each of the operations described has its advantages and its disadvantages, and comparison may not be amiss at this point. The classic section, or corporeal hysterotomy, is simple and easy to perform; and when undertaken in an emergency, it is likely to turn out well. In cases of placenta previa, for obvious reasons, and in conditions of ventral fixation, because of disturbed relations and obscuration, it is again the preferred operation. On the other hand the low operation is less likely to be followed by ventral hernia. There also is less hemorrhage from the incision. Delivery of the placenta becomes easy, almost physiologic; and there is less shock and less danger of peritonitis.

Offsetting these points in its favor is the fact that the low operation is complicated, and requires greater skill to perform it. It is also charged that because of its thin wall, a scar in the lower segment is more likely to give way in a subsequent pregnancy; however, this has not become well-established.

### AFTER-CARE

The after-care of a patient delivered by cesarean section is that following any abdominal operation, plus the puerperium. She should lie quietly on the back for the first few days. She may drink freely of salt water, have cracked ice, sips of iced tea, and such things as are not likely to cause retching. It is quite usual for patients to suffer from tympanites, and the drug, *par excellence*, for its relief is pituitary extract, given in

small doses three or four times daily for the first three days. Ordinarily, flatus will not get to the sphincter ani before the third day, but after the administration of pituitary extract, it begins passing much earlier.

On the third day the bowels should be opened with a clyster or a tablespoonful of castor oil, preferably given in the morning before eating. After the bowels have been opened, the nourishment may gradually be increased up to full diet.

The skin sutures are removed after seven or eight days, but the wound should still be protected and supported with a light dressing.

Close observation should be made of the lochial discharge, noting whether it be normal and continuous. If disturbed, it may mean that it is being forced through the uterine wound into the peritoneal cavity. Indeed, it is not improbable that much of the puerperal morbidity in these cases comes from such leakage.

In other respects, the after-care is the same as that of the normal puerperium, even to the nursing of the baby.

### THE RADICAL OPERATIONS

**Indications.**—Where infection is known, or strongly suspected; where there is complete atresia of the birth canal, so that free drainage can not take place; in conditions of osteomalacia, a disease said to be cured by a removal of the ovaries; in the presence of carcinoma and multiple myomata, one finds indications for the radical, rather than the conservative, operation.

**Porro's Operation.**—The preparations and first steps of the Porro operation are the same as those of the classic section. There are two ways of dealing with the cervical stump: (a) the retroperitoneal and (b) the extraperitoneal.

(a) **THE RETROPERITONEAL TREATMENT OF THE PEDICLE.**—Since the uterus is opened only after it has been delivered, the abdominal incision must necessarily be a long one. The organ is turned out, the peritoneal cavity protected with sterile towels, and the uterus incised on its anterior surface. No attempt is made to remove the placenta. If it comes away spontaneously, no harm is done, but it causes less trouble if it be left.

Aside from the gestational alterations in and around the uterus that have to be taken into account, the steps of the operation are essentially the same as in suprapubic hysterectomy. Both broad ligaments, together with the Fallopian tubes and



Fig. 156.—Supravaginal amputation of the uterus, with conservation of one ovary.

ovarian vessels, are clamped, tied, and severed; the round ligaments on both sides are similarly tied and cut; and, finally, the uterus is amputated (Fig. 156). The serous membrane of the cervix, unless drainage is desired, is closed above, and the

stump made retroperitoneal by first suturing the severed ends of the round ligaments and tubes together, and then sewing the peritoneum over the entire pedicle (Fig. 157).

(b) **THE EXTRAPERITONEAL TREATMENT OF THE PEDICLE.**—After opening the abdomen in the median line and turning out the uterus, the cervix is sutured to the lower angle of the incision. This somewhat fixes the organ and at the same time partially closes the peritoneal cavity. With sterile towels packed about the wound,

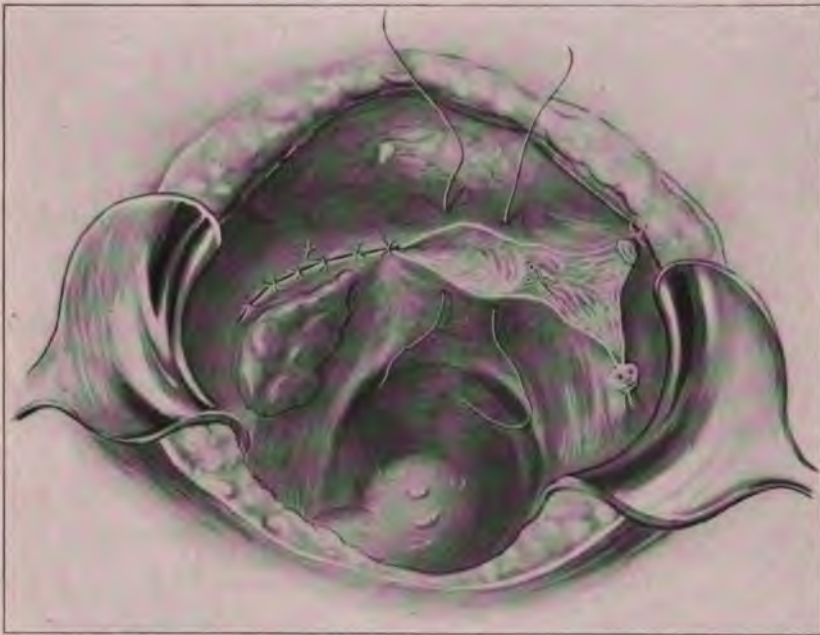


Fig. 157.—Closing over the cervical stump. (After Döderlein and Krönig.)

especially the upper part, the uterus is opened and the child extracted. The suturing of the serosa to the parietal peritoneum is then continued all the way round, and the abdominal cavity effectually shut off. An elastic ligature may be placed about the cervix before the resection is made. The stump is cauterized, the cervix transfixed with a strong needle, and the abdomen closed. Recovery from the operation is tedious, and the tendency to hernia is much increased by the fascial defect.

**Total Extirpation of the Uterus.**—The abdominal incision in this

The uterus was so twisted upon itself that its left lateral border came to the median line in front. The vessels were enormously developed, some of the veins in the broad ligament being as large as the finger. Delivery was made through a longitudinal incision, the placenta was expressed, and the uterus was closed in two layers.

After the uterus has been emptied by cesarean section, a troublesome atony sometimes supervenes. To guard against such a contingency, pituitary extract or ergot should be given shortly before the operation is begun.

In the presence of hemorrhage, the uterus remaining large and flaccid, certain other measures may be taken to bring about better tone in the organ. Direct massage of the uterus, thermic irritation, sterile compresses, tamponing of the cavity, are all helpful in the control of hemorrhage. Placing an elastic band around the cervix may check the bleeding temporarily; and, in the suprapubic operation, the Momburg tube bound about the waist may be employed. The suprarenal extract, also, has proved of service in controlling hemorrhage. A syringeful (1:10,000 solution) is injected into the uterine wall. If all efforts to stop bleeding fail, the uterus must be amputated.

### PROGNOSIS AND STATISTICS IN CESAREAN SECTION

The prognosis in cesarean section, so far as the mother is concerned, depends mainly on preliminary conditions. If performed by experienced surgeons and under favorable circumstances, the outcome is good; but bad if performed by the general practitioner and in the patient's home, especially if repeated examinations and manipulations have been made. It is better, therefore, if the woman on whom it is thought necessary to perform such an operation be taken to the hospital and proper arrangements made before she has been exposed to infection or exhausted by labor.

Other things being equal the radical operation is accompanied by more serious consequences than is the conservative. But very often they are not equal, since the radical operation is performed for the very reason that the case is already complicated by infection. Out of 456 classic sections performed by Oldhausen, Leopold, and Schauta, 30 deaths, or less than 7 per cent, occurred.

On the other hand, the mortality in radical procedures has been between 16 and 23 per cent.

In the presence of infection and the performance of a radical operation, it is still possible for detached portions from a septic thrombus to find their way through the circulation to more distant parts of the body, where they develop into metastatic abscesses.

If, after a classic section, a diffuse peritonitis occurs, it is necessary that the abdomen be opened and drained; and should infection follow the low operation, the connective tissue overlying the pubes and in front of the cervix must also be opened and drained.

Any marked lessening of the flow indicates that, instead of passing away as it should, the lochia is being retained within the uterus, or, possibly, discharging into the peritoneal cavity, and calls for investigation. The introduction of a finger is generally sufficient to establish the patency of the cervix, although a drainage tube serves the purpose better inasmuch as it keeps the canal open.

**The Prognosis for the Child.**—This is particularly good. If living when the operation is begun, it should be born alive, though it is not uncommon for the baby to be born in apnea. This comes from its being so rapidly removed from the uterus that the usual stimuli of parturition are lost; and the blood is still so rich in oxygen that excitation of the respiratory center is delayed. The same thing is to be observed in precipitate labors. Generally, the child begins to breathe and cry in a few moments. An asphyxiated condition is much more troublesome, coming as it does from more profound influences; and for this reason narcotics should be withheld before operating, and the anesthesia should be as brief as possible.

Since cesarean section is oftenest undertaken in the interest of the mother, the outlook for the baby is relatively less favorable, as shown by the following comparison: In 1,108 radical operations, there was a fetal mortality of 22 per cent; while in 551 conservative procedures the mortality was only 7.5 per cent.

A woman who undergoes cesarean section may, unless something is done at the time to cause her sterility, be confronted

with the same operation again. And, aside from the dangers of repeated operations, there is also the possibility of the uterine scar giving away during pregnancy. This is not a common casualty, yet eighteen such cases were reported between the years 1895 and 1910, which is not a very great risk, considering the large number of sections performed. It is probable, however, that a later report, one which shall include more suprapubic sections, will show a greater proportion than this, reasoning that, inasmuch as the scar is located in a zone which of necessity undergoes much attenuation, the chances of rupture will thereby be increased.

### **SECTION PERFORMED ON THE DEAD OR DYING**

Based on the fact that the unborn child may continue to survive for a short time after its mother's death, it has been legally established that it should be given the further chance of living by being rapidly delivered through the abdomen. In some countries it is left to the judgment of the physician as to whether or not this shall be done. If no signs of fetal life are yet remaining, he may decide that such an operation is uncalled for. In other countries a physician is bound to perform it or suffer prosecution.

If at the time of death the parturient canal appears to be sufficiently dilated to permit it, the fetus may be delivered with forceps, or turned and extracted. If this does not appear easy of accomplishment, cesarean section should be performed. Twenty to twenty-five minutes is about the limit the fetus can survive after the mother dies. If positive signs of fetal life, such as heart-beat and movement, can be demonstrated, the indication for delivery, either by section or accouchement forcé, is positive. Yet, on the other hand, if no such signs are to be made out, and there is still reason to believe the child may be alive, one is justified in urging upon the family the reasonableness of trying to save it. Nor should valuable time be lost in trying to prove that the child is or is not alive: it may be in asphyxia and yet be resuscitated. (See Dr. Mack's case, page 245). To attempt to save a fetus so immature that it could not survive under any circumstances would, of course, be ill advised.

The operation itself is nothing more than a cautious opening of the abdomen and uterus, and the simple closure of the abdominal wall with a running suture.

Attempts to resuscitate the child should not be abandoned under an hour.

About 50 per cent of the children so delivered live.

Under some circumstances a physician is justified in making the section on a woman not yet dead, but in a dying condition. It should not be done, however, without a consultation of physicians and agreement that the mother is beyond recovery and that the child is living. The same technic should be followed that is observed when operating under more hopeful conditions.



## CHAPTER XIII

### VAGINAL CESAREAN SECTION

#### INDICATIONS

Vaginal hysterotomy, or, as this operation may properly be called, colpohysterotomy, is a formidable procedure, and is undertaken only upon certain well-defined conditions.

**Complications Developing in the Pregnant State Which Make Immediate Delivery Necessary.**—Under this head should be mentioned, first of all, eclampsia; more rarely, premature separation of the normally located placenta, placenta previa, and certain internal diseases, particularly the more serious affections of the heart, lungs, and kidneys.

**Stenosis of the Cervix, Which, in the Process of Labor, Presents an Effectual Bar to Natural Birth.**—In this category belong tumors, especially myomata, developing in the cervical wall or on the portio vaginalis; also cicatricial changes, either inherent or acquired.

**Asphyxia of the Child Early in Labor.**

#### APPLICABILITY

Though carried out after the most approved methods, vaginal cesarean section is governed by usages which hold good in all gynecologic work. Most important of these are the limitations natural to the parts. Unforeseen accidents and complications occurring in the course of the operation are made more difficult, and success materially interfered with, when working under such disadvantages. The only reason why vaginal section is considered less formidable than the abdominal is, that the uterus is opened extraperitoneally. Of the two operations, the former is the more difficult to do; and as a surgical procedure it demands the same exactness in asepsis, hand-cleansing, preparation of instruments, and sterilization of dressings.

**Ample Pelvic Diameters.**—One should not attempt to deliver by the vaginal route in the presence of an absolute indication for abdominal section, given by the pelvic diameter.

**Mobility of the Uterus.**—The soft parts must admit of the necessary technic. Only when the uterus is freely movable and the cervix can be drawn down to the introitus is the operation easily performed. If the tissues are much swollen, or if there is abnormal resistance of the parametrium or of the fundus vaginæ, vaginal hysterotomy becomes very difficult.

**Asepsis of the Birth Canal.**—While an aseptic tract guarantees a reactionless recovery, a slight rise of temperature does not constitute an absolute contraindication. If sepsis is manifest, however, the undertaking becomes extremely risky, since not only the wound itself becomes purulent, but the process may go on to a general infection.

## PREPARATIONS

The patient is placed in the lithotomy position on the operating table, the thighs everted and the knees supported. The pubes should be shaved, and the vulva and vagina thoroughly cleansed and disinfected. Catheterization of the bladder must not be overlooked. Simple loose draping of the lower body is never satisfactory, for it is continuously becoming disarranged. Sterile leggings that extend to the groin and fasten about the waist are easily put on and will not come off. Two assistants, one on either side, an anesthetist, and a nurse are needed.

The following instruments should be sterilized: scalpels, a number of artery forceps, two toothed forceps, for grasping the portio vaginalis, tissue forceps, scissors (both straight and curved), needle-holder, needles, a weighted speculum, retractors, sponge probangs.

For suture material, twenty-day catgut in the smaller sizes generally is used, though silk or linen is preferred by some surgeons. In other respects the preparations are the same as for abdominal section.

**TECHNIC**

Very frequently, and especially in the primipara, it is desirable to enlarge the introital opening by incising the vulvovaginal



Fig. 158.—Vaginal cesarean section. Severing the portio vaginalis.

tissue at one side of the perineum. To do this an assistant introduces his index finger into the vagina on the left side, the opera-

tor the index finger on the right side. Putting the posterior commissure on stretch, an incision is made midway between the anus and the ischial tuberosity, going deep enough to include



Fig. 159.—Separating and pushing back the bladder from the cervix.

the musculature of the pelvic floor. The section may sometimes have to be carried as high as the vault of the vagina. Numerous

severed vessels will need to be ligated. The gaping wound is loosely packed with gauze, and the vagina widely retracted. The anterior lip of the portio vaginalis is grasped on both sides of the middle line with vulsella, and drawn down as far as possible.

Beginning at a point at about 2 cm. below the urethral opening, the everted and stretched vaginal wall is incised longitudinally as far as the cervicovaginal junction, care being taken to cut through only the mucous membrane (Fig. 158). In the lower third of this section will be seen the slightly bulging border of the bladder, which comes more clearly into view as the vagina on both sides is freed from the cervix (Fig. 159). The space beneath is now penetrated with the upper point of the scissors, and further separation made between the bladder and the uterus. This is best done with the gauze sponge held between the thumb and finger, or by gauze worn as a cot over the finger. A narrow speculum at first, a wider one later, introduced into the vesicouterine space, serves to keep the bladder up out of the way, and expose the denuded isthmus of the cervix. Thus freed, the organ is opened with straight scissors, the section beginning at the portio vaginalis and extending up to the peritoneal boundary. As the operator cuts, his assistants, who maintain a firm hold on the portio with vulsella, separate the incised wall and make downward traction at the same time. Performed in this way, there is little danger of wounding the bladder. The amniotic sac is likely to be opened, so that the fluid escapes, but no harm is done thereby.

If the fetus is small, the anterior section will give sufficient opening for its passage; but in large babies it often becomes necessary to enlarge the aperture by extending the incision posteriorly. The hand passed into the uterus and withdrawn closed gives a fairly satisfactory estimate of proportions, but a more satisfactory way is to introduce a collapsed hydrostatic bag, distend it, and continue the section until the opening is large enough to permit its delivery. It is better to make the wound a little too large than a little too small, for the reason that if it is too small and the child is extracted at the expense of the tissues, the resulting laceration becomes more of a problem than a clean-cut wound.

tor the index finger on the right side. Putting the posterior commissure on stretch, an incision is made midway between the anus and the ischial tuberosity, going deep enough to include

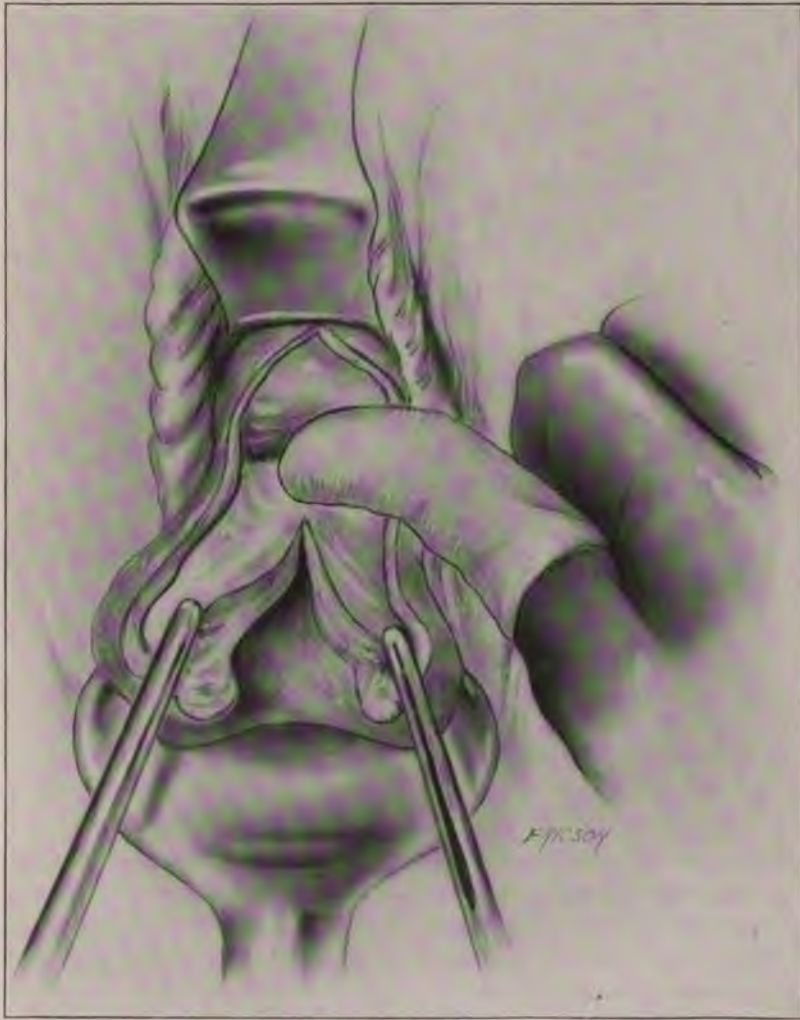


Fig. 159.—Separating and pushing back the bladder from the cervix.

the musculature of the pelvic floor. The section may sometimes have to be carried as high as the vault of the vagina. Numerous

## THE SURGICAL PROCEDURES

The placenta should be expressed at once. If this is not accomplished, it should be removed manually. Manual delivery is not desirable, because with the loss of the placenta is a needless loss of blood, which should be kept as close to a minimum as possible.



Fig. 1. Making the incision in the cervix.

The cervix contracts well, especially when pituitary has been given preliminary to making the section. Irrigations are of value; and, in the early stage of the uterus may temporarily be

packed with iodoform gauze. Dührssen, Döderlein, and others make it a practice to do this in every case.

The retractor is now reintroduced and the separated edges of the cut uterus brought in apposition with forceps, not depending on a single vulsellum on each side, but making use of several if considerable traction must be made on the tissues in order to bring the upper end of the incision into view. Beginning at this point, the wall of the uterus down to the external os is united with interrupted twenty-day catgut; this completed, the suturing of the anterior vaginal wall follows (Fig. 160). If the cervix has been opened behind, as well as in front, the posterior incision should be repaired first, all suture knots being tied within the canal (Fig. 161). The episiotomy wound made at the beginning of the operation may require both buried and superficial suturing. (See Episiotomy, page 336.)

### PROGNOSIS

For the mother, the prognosis is favorable; her life is not greatly endangered by it, and the gynecologic sequelæ are no more serious than those following a difficult instrumental delivery. But for the child, the outlook is not so good, the baby often succumbing to the violence of delivery. Of the viable children, about 33 per cent are lost. In the presence of edema, pelvic contraction, and in large children, the fetal mortality runs very high and the maternal mortality reaches about 14 per cent. This does not mean that the operation itself is very serious, for only about 2 per cent of the mothers die from this cause alone; but that the complication making the operation necessary is serious.

For the following excellent reports, I am indebted to Professor Hammerschlag.

CASE 1.—Eclampsia with six seizures; death following vaginal section. Aged 16; primipara. Startlingly anemic; pupils wide; pulse small and frequent; introitus and vagina contracted; portio vaginalis preserved; os uteri dimpled.

Operation: Large paravaginal section; hemorrhage controlled. The portio was found edematous and easily torn; in attempting to bring it down, the whole posterior lip tore away. With great difficulty the vaginal wall was separated, and the bladder pushed out of the way. Not being able to expose



the anterior cervical wall with a speculum, the uterine section was made mainly by sense of touch. The child was turned and extracted, but only after great exertion. The placenta was expressed. The walls of the uterus were sutured together as far up as possible, and the cavity tamponaded. Seven hours later, the patient died.

Autopsy: The peritoneum was intact. The parametrium, especially on the left side, was greatly distended with coagulated blood, the hematoma extending retroperitoneally nearly to the kidney. The vagina and uterus, with the exception of a rent in the upper angle of the section, were found well sutured. Through this tear, which was about an inch long, had occurred the fatal hemorrhage.

CASE II.—Eclampsia with ten seizures, accompanied by severe coma. Aged 27; primipara. Vaginal cesarean section. Portio shortened, and os merely dimpled. Vaginoperineal incision. Could not draw the cervix down; marked friability of the tissues. Anterior vaginal wall and cervix separated and retracted; bladder shoved out of the way. The uterine incision was carried high. Child delivered with forceps. The bladder was torn for an inch in a cross direction. Immediate repair of the organ failed to close the opening; a fistula developed, which later was cured by operation after two attempts.

CASE III.—Eclampsia. Patient was brought to the hospital after four seizures; delivered by vaginal section; continued to have convulsions. Aged 21; primipara. Comatose condition. Temperature normal; pulse 152. Urine nearly solid with albumin. Prognosis serious.

Examination: About term. Vertex position; cervix undilated; vagina contracted.

Section and delivery. Portio and vagina separated crosswise in anterior vault. Bladder pushed out of the way. Cervix opened between vulsella up to the peritoneal origin, the amnion rupturing. Forceps applied in transverse diameter; head delivered slowly; wound margin very taut. Rupture, extending up the right side for nearly an inch and a half beyond the angle of incision. Placenta expressed. The incision and tear were united by interrupted catgut sutures. Uterus tamponed with iodoform gauze, serving to keep the cervix open and allow the lochia free drainage. The loss of blood amounted to 500 c.c. The child lived and was of average size.

Immediately following the operation, the patient had the eighth convulsion. She was given subcutaneously 500 c.c. of saline infusion. There was a pause then of six hours, after which the attacks began again, continuing to recur at intervals of from five minutes to an hour and a half. Altogether there were twenty convulsions. There was tracheal rattling; the temperature rose to 105 degrees; the pulse reached 132; and there was continued coma. After the tenth attack, 2 gm. of chloral hydrate were given by enema. After the fifteenth seizure, a hypodermic of morphine was injected. Camphorated oil and saline infusion were made use of. It was thought possible that the iodoform gauze in the uterus might be the exciting cause of the convulsions, and it was removed. There were no more spasms, the temperature came down rapidly to normal, and the pulse to 96. Recovery continued undisturbed. The mother and baby were discharged well.

## PART II

### MANAGEMENT OF THE SERIOUS COMPLICATIONS

#### CHAPTER XIV

##### THE THIRD STAGE OF LABOR

**The Physiology of Cleavage and Expulsion.**—It is an observation easily made that the uterus, as soon as the child leaves it, becomes smaller, the fundus sinking to about the level of the umbilicus. Coincident with this reduction in size is a readjustment of structure, which causes the placenta to be cleft from its attachment, a process that takes on the average, somewhat less than a half hour to complete. In this process of cleavage, three acts, or, more correctly speaking, three phases of a single act, take place, relaxation, hemorrhage and contraction. The placental site expands, the intervillous spaces and maternal vessels fill with blood, and, finally, the cycle ends in a contraction. This is repeated several times before the placenta becomes fully separated from its decidual base. As the placenta loosens, the layer of muscle contracts with each gain until the wall of the uterus at this point becomes as compact as in other portions of the organ. Failure to contract accounts for most of the troublesome hemorrhage that occurs during the placental stage and the period immediately following it.

Many agree with Schultze that separation starts near the center of the placenta (Fig. 162); others just as ardently contend with Duncan that it begins at the margin (Fig. 130). If the cleavage begins in the center, there is little escape of blood until after the placenta is delivered, when one may find extravasated blood adhering to its uterine surface (retroplacental hematoma);

if separation begins at the edge of the placenta, the blood readily escapes, and no such clot forms.

After a few contractions, generally not more than eight or ten, detachment becomes complete, and the placenta moves into the lower confines of the uterus. As cleavage and extrusion go on, the after-birth becomes inverted, taking with it the amnion, which also turns inside out as it comes away. This is particularly true if separation is of the Schultze type.

The placenta, which now comes to lie in the lower segment of the uterus, or, perhaps, in the vault of the vagina, can not be

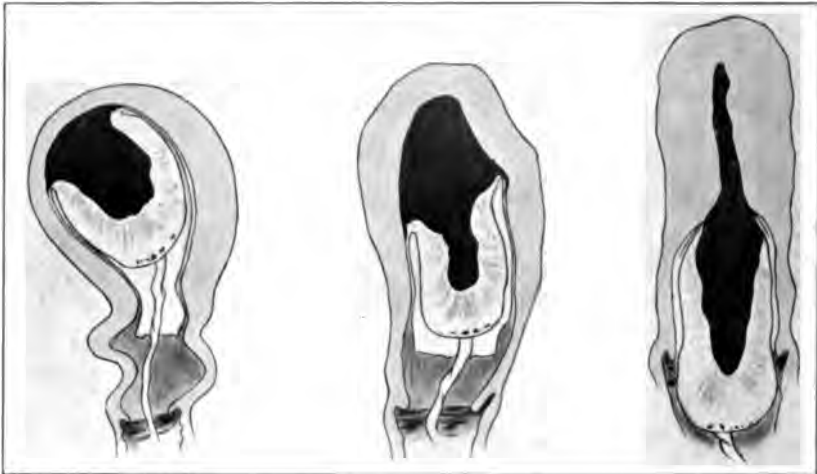


Fig. 162.--Placental separation and expulsion as described by Schultze.

expelled by the uterus alone and another force, that of intra-abdominal pressure, is necessary to complete the process. The mere presence of the bulky after-birth in the genital tract may excite sufficient activity to cause its passive expulsion, but in nearly every instance the patient is obliged to make some voluntary effort. Upon its complete evacuation, the uterus subsides into a state of tonic contraction, which continues throughout the puerperium.

**Management.**—Two very important practices should govern the obstetrician in the management of the third stage of labor: first, never to disturb its normal course, and, second, immediately to

correct any deviations from the normal. Let us consider for a moment the normal course.

As soon as the child is born the delivered woman is straightened out in bed on her back, a fresh sterile dressing is applied to the vulva, and she is allowed to rest. If the bladder has become overdistended with urine during the labor, it should be emptied; otherwise the process of placental detachment and expulsion should not be interfered with.

For the first few minutes the physician is concerned in the amount of blood that is lost, and the height, position, and hardness of the uterus. If the fundus remains near the level of the umbilicus, and is hard, the cavity of the uterus contains no great

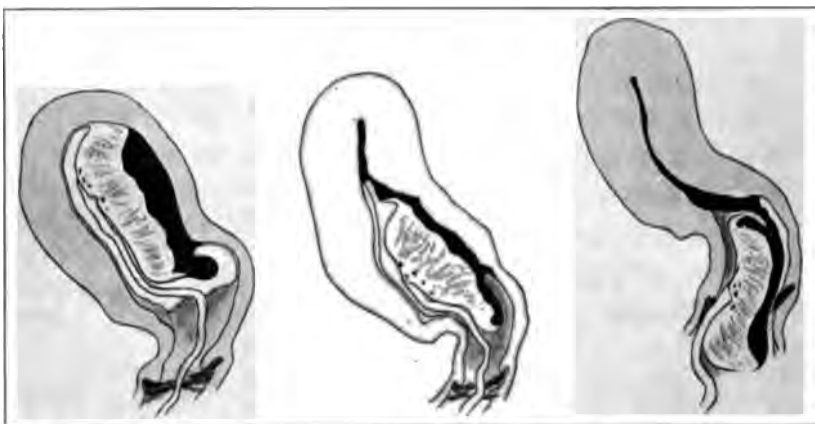


Fig. 163.—Placental separation and expulsion as described by Duncan.

amount of blood; if the organ is large and soft, there may be considerable.

Unless there is some special indication for manipulation, the uterus should be left entirely alone. If a severe hemorrhage demands attention, as may be the case in a flaccid atonic uterus, its contraction may then be encouraged by gentle massage, made with the tips of the fingers.

When completely detached, the placenta should be expelled by abdominal pressure. After half an hour it may be considered that separation has taken place, since in the majority of cases it is effected in a much shorter time. Separation being estab-

lished, it is suggested to the patient that she "bear down;" and at the same time the physician makes firm pressure on the fundus with his hand. No other manipulations are necessary in an absolutely normal delivery of the placenta.

If, after half an hour, the placenta has not become detached,



Fig. 164. -Expressing the placenta.

the first thing to try is that of expression. The uterus is **brought** to the middle line and massaged until it becomes well **contracted**. It is then grasped with the hand, the fingers lying behind **and** the thumb in front of the fundus, and pressure made in a **down-**

ward direction. Delivery is generally successful the first time it is attempted; but, in case it is not, other trials may be made (Fig. 164).

The placenta should be inspected as soon as it is delivered. Spread out on the palm of the hand, its maternal surface is ex-



Fig. 165. Placenta with three secondary portions. (Bumm.)

amined for defects and irregularities. Normally it is covered with a gray coating of decidua, the margins blending smoothly into the amnion. Torn vessels found running into the amnion indicate that an accessory part of the placenta has been left behind, and show its connection with the larger structure. (Fig. 165.)

**Disturbances.**—The disturbances that occur in the third stage of labor are mostly the result of imperfect cleavage or the failure to expel the placenta after it becomes cleft. The first of these may be due to various causes, such as inertia of the uterus, abnormally close attachment of the placenta, its unusual size and irregular form, interstitial tumors, etc. The inertia may accompany a very rapid emptying of the uterus, as by operation; it may succeed upon a long and exhausting labor; it may result from overdistention of the uterus, as in hydramnion, and twins; or it may be of infectious origin. The intimate attachment of the placenta comes from endometrial processes, the decidua undergoing pathologic thickening; or, as may occur in atrophic development of the decidua, the chorionic villi may penetrate the underlying muscle. Abnormally firm union between the placenta and uterus may also accompany a low attachment of the embryo, as in placenta previa. Infectious diseases and nephritis, too, are said to favor it. It is to be observed in this connection that having once occurred, a disturbance in separation is quite likely to occur again should pregnancy be repeated.

Disturbances of expulsion are due mainly to insufficient abdominal pressure; but there may be other causes. A not unusual one arises in the uterus itself. A contraction of the internal os or of the ring of Bandl above it, may be so marked as to effectually imprison the placenta. Such a condition is most likely to follow an operative delivery in the first stage of labor, performed before the lower segment has become thinned out and the inner os fully effaced. Faulty management and improper manipulations are also responsible at times for such action of the uterus. I nearly lost a patient by trying to express the placenta when, after a reasonable effort without success, my continued manipulations served only to drive the uterus to greater resistance.

The amount of disturbance to accompany the third stage of labor depends largely on the completeness or incompleteness of placental detachment. If no separation at all takes place, nothing particular is noticeable until decomposition sets in. When partial separation takes place, the symptom-complex will depend on the amount of bleeding that follows. With the outlet unobstructed, the blood, which is of a dark venous color, flows in

a continuous stream from the introitus; but when the outlet is occluded, as it may be with membranes or with a part of the placenta itself, the blood accumulates above the obstruction. The signs of anemia, however, are the same, whether the blood is discharged or retained. In either case the symptoms become noticeable as soon as the loss goes beyond a certain amount, a liter being quite sufficient to cause pallor. The pulse, too, becomes small and frequent, and the patient complains of being cold, and is drowsy and apathetic. If the hemorrhage continues unchecked, it is followed by swooning, vomiting, severe dyspnea, profuse sweating, and, eventually, by death. The normal blood loss is between 300 and 500 c.c., but may in some instances, amount to as much as 600 c.c. without going beyond the bounds of safety. Much depends, of course, on the size of the individual and on her physical health.

If, in the third stage of labor, hemorrhage can not be checked by uterine massage, measures must be undertaken at once to empty the uterus of the placenta, since only after it is out of the way will the uterus remain contracted. It is not generally possible to express the placenta before it is wholly loosened, yet sometimes it will come away with one or more cotyledons missing. Even after the placenta is detached, its expression can still prove very troublesome. A thick abdomen, for example, makes it extremely difficult to span the uterus effectively; and oversensitiveness, extreme anxiety, and fear greatly interfere with manipulation; and, when attempted, it only serves to increase the rigidity. The size of the uterus, too, makes considerable difference. If it is small, as in premature interruption of pregnancy, very little can be accomplished by pressure; if it is very large and wide, as in hydramnion, it is hard to grasp. All such hindrances are greatly lessened by narcosis.

Contractions of the internal os or of the ring of Bandl above can so effectually lock the placenta within the uterus as to make expression, at least for the time being, impossible. If the bleeding is not severe, so that one may safely defer the completion of the third stage for a time, rest should be enjoined and a hypodermic of morphine and atropine allowed. But in the presence of anemia and continued hemorrhage, the immediate removal of the placenta is necessary.



## MANUAL DETACHMENT OF THE PLACENTA

Manual detachment of the placenta should be undertaken only when other measures fail, not omitting their trial under narcosis.

### Indications

**The Amount of Blood Lost Exceeding One Liter.**—Since the bleeding can not be controlled with the placenta still undelivered, its removal becomes necessary.

**Retention of the Placenta Without Bleeding.**—So long as the placenta remains adherent, there can be no hemorrhage; and were it not for the decomposition that follows, it might be left indefinitely. Its presence, however, opens a field of sapremic activity, not to mention the more virulent forms of infection. Besides, there is always the possibility of the placenta becoming detached, partially, if not completely, and serious hemorrhage taking place; therefore, its retention is a constant menace that should not be suffered to continue for many hours, even if the loss of blood be negligible.

**Escape of the Placenta Through a Rupture in the Uterus.**—Should the detached placenta find its way through a rent in the uterus, the hand must seek it. Whether by way of the vagina or abdomen will be discussed later. (See Rupture of the Uterus, page 308.)

**Positive Proof That a Portion of the Placenta Has Been Left.**—If, after very painstaking inspection, one is in doubt as to whether or not a part of the placenta has been retained, he may await the development of symptoms before introducing the hand; but if he is positive that a piece of considerable size has been left, he should remove it. Retained pieces of membrane do not cause hemorrhage, and are not responsible for puerperal morbidity to any great degree.

**Constriction of the Internal Os or of the Contraction Ring.**—The presence of such a constriction can make delivery of the placenta impossible, except by instrumental or manual means; and then, if the contraction is marked, its preliminary dilatation may be required before the hand can be passed.

### Technic

The patient is placed crosswise on the bed in the usual position for operation, and an exceptionally careful disinfection is made of the vagina and external parts. As always before operating, the bladder should be emptied by catheter. In desperate conditions one may proceed without anesthesia, but usually there is no great risk in narcosis if given cautiously. Very little of the agent is needed because of the lowered sensation due to anemia. If one has to deal with a cavity no longer aseptic, it should be thoroughly irrigated with a mild antiseptic before beginning the operation. For this purpose a solution of iodine (2 c.c. of the tincture to 2 liters of water) serves the purpose well. The bulk of the germs are either washed away or destroyed by it. The hands and arms of the surgeon are thoroughly disinfected; and it is particularly important that a glove be worn.

Kneeling before the patient, the operator takes hold of the protruding cord with one hand, making gentle traction upon it, while with the other he follows along its course through the vagina into the uterus and on to the placenta. When this area is reached, his hold on the cord is released, and the opened hand is applied externally to the fundus, which is held firmly against the internal hand. With the ulnar side of the hand pressing against the uteroplacental border, the palm turned toward the placenta, separation is begun by a back and forth movement, beginning at the most distant point of attachment and continued toward the operator (Fig. 166). Very often a partial loosening has already taken place, which is an aid in determining the proper layer; but one will occasionally meet with so much resistance that he will be in doubt, and may find that he is working in the substance of the placenta itself or in the deeper strata of the uterine wall. Rarely, though, is the connection between them so intimate as to be misleading. Generally, separation is easily accomplished.

The operation is accompanied by a marked hemorrhage, which stops, however, as soon as detachment is complete. The placenta is grasped in the hand, and brought out of the uterus in as compact a state as possible. Along with it follows the amniotic membrane, which peels readily from the decidua. To make sure no part of the after-birth still remains, it is advised that the hand, after further

disinfection, be reintroduced and the cavity carefully explored. With the exception of the placental site, which normally is rough and uneven, the entire intrauterine surface feels smooth. The operation is concluded with a hot saline intrauterine douche, the



Fig. 166. Manual separation and removal of the placenta. (After Bumm.)

purpose of which is quite as much to stimulate contraction as to wash away loose particles of tissue, clots, and germs.

Undertaken with the patient in the dorsal position, manual detachment of the placenta is more difficult than the foregoing would make it appear, if the attachment is to the anterior instead of the

posterior wall of the uterus. In this position the placenta is hard to reach. One can curve the arm forward and separate it from the uterus with the ends of the fingers, as shown in Fig. 166; but it will be more uniform with the technic described if the patient be turned on the side. This need not disturb the operator, nor complicate the situation. With the hand still in the uterus, the patient's leg is carried over the physician's head as the change from a dorsal to a lateral position is made. One is cautioned, however, not to withdraw the placenta with the woman in this posture as it increases the danger of air embolism.

A not infrequent complication, one that materially interferes with the removal of the placenta, is the contraction of the cervix, and this must be overcome before the hand can be passed into the cavity of the uterus. Beginning with one or two fingers, others are introduced in succession until the canal once more becomes dilated. If it is only a portion of the placenta which remains, it may be possible to remove it through a cervix only partially dilated. If one or two fingers can be passed through the canal, such pieces may be dislodged; and with the other hand applied over the fundus, they may be expressed.

If the loss of blood is severe, not only must the immediate hemorrhage be controlled, but the anemia, as well, relieved. It may be necessary in some instances to deal with the anemia before removing the placenta, particularly if the hemorrhage has abated somewhat. And, again, both anemia and hemorrhage may be dealt with at the same time, an assistant infusing the patient, the surgeon seeking to check the bleeding.

### PROGNOSIS

The prognosis is influenced by two things, sepsis and trauma. If external manipulations alone are made, infection is not possible. As for the injuries, most of them are in the nature of bruises that pass away unnoticed. Sometimes, however, a more serious injury than mere contusion may result from pressure, such as inversion of the uterus. The dictum of Crede, "never to attempt expression when the uterus is flaccid," should not be forgotten; and a dimpling of that organ, which is sometimes to be made out if the abdominal wall is thin, should warn one against further pressure.

### TREATMENT OF INVERSION

Because of its close connection with the delivery of the placenta, a few words about the treatment of inversion will not be out of place here. (Fig. 167.)

The fundus is grasped at its most dependent part, and, together with the attached placenta, pushed back into the pelvis. Not suc-



Fig. 167. A retroversion of the uterus, with the placenta still attached.

ceeding thus easily in restoring it to its normal relations, one may be able to turn it back it, instead of applying pressure to the fundus, the reduction is begun at the cervix. After complete restoration the placenta is detached manually, and the cavity packed with gauze. Only when the placenta has become partially detached does one complete its separation before reducing the dislocation. If

neither of the above maneuvers succeeds, the patient should be anesthetized and the same manipulations repeated under narcosis. Unless the dislocation can be corrected very shortly after it occurs, and rather easily, it is best not to continue the manipulations for more than a few minutes, for failure only causes opposition by intensifying the contractions. The next thing to try is slow reduction by means of gauze packing or the use of the hydrostatic bag. The fundus is pushed as far up the canal with the hand as it will go, and the vagina tamponed, the pressure being maintained by a firmly applied T-binder or with the hand. The bag answers the same purpose, but it is rarely available, especially in general practice. Reduction by it is accomplished without much difficulty, except when the inversion is of long standing. It then becomes a gynecologic procedure.

There are few other casualties to complicate manual detachment of the placenta. Separation at some point other than through the decidua layer may occur if the fingers be forced into structures having fibrous resistance. An injury so unwarranted as the penetration of the vaginal wall with the hand, is not unheard of, though this could hardly happen if the precaution to follow up the cord to its insertion is taken.

The danger most to be feared in manual delivery, is that of infection. The hand, coming as it does in contact with the open lymph and blood vessels, inoculation with microorganisms becomes extremely easy. Only when the time taken to secure cleanliness may cost the patient her life, is one justified in omitting any part of his usual precautions. Rubber gloves, by all means, should be worn. The danger of course is increased if infection already exists in any part of the birth canal.

Manual delivery of the placenta would seldom be necessary if the normal third stage of labor were more carefully conducted. It should never be undertaken before first trying other and safer methods, not forgetting the advantages to be gained by narcosis. Untimely manipulations, massage, and premature attempts to express the placenta are responsible in most instances for the conditions which make manual interference necessary.

## CHAPTER XV

### POSTPARTUM HEMORRHAGE

**Checking the Hemorrhage.**—In the way of hemostatic drugs, ergot and pituitary extract, given hypodermically are the ones usually administered. In anticipation of hemorrhage, as may be the case in twin pregnancy or in hydramnion, it is well to give one or the other of these preparations immediately after the delivery of the placenta. At least no harm is likely to come from their use.

If, in spite of such measures, the uterus remains in a state of atony, a hot antiseptic douche should be given, partly in the uterus and partly in the anterior vault of the vagina. Massage of the uterus should accompany and follow the irrigation. Should the hemorrhage continue unabated, the disinfected gloved hand may be passed into the vagina, and the uterus anteflexed and massaged more directly. (Fig. 168.) After withdrawing one hand, the other should still press the uterus against the symphysis until all danger from immediate hemorrhage is past. Sometimes, instead of merely supporting the uterus, the hand may be passed on into it and closed, thus making counterpressure even more effective.

The hemorrhage still continuing, constriction of the body after Momburg's method may be tried. Rubber tubing (common red rubber gas tubing), a couple of yards in length, is bound about the patient's waist. Once around is not enough; it should go around at least twice, perhaps three times (Fig. 169.) Unless the constriction is powerful enough to shut off the arterial circulation, the lower extremities become intensely hyperemic without checking the hemorrhage. A half-hour is as long as the tube should remain in place. Its release should be gradual, else the greater volume of blood thrown suddenly into circulation may seriously embarrass the heart action. If bleeding starts afresh after its removal, the tube had better not be reapplied, but the cavity of the uterus tamponed instead.

To simplify the procedure of packing the uterus, the cervix should be well exposed through a speculum, and drawn down to the introitus. The gauze pack is most aseptically applied if it is introduced directly from the container in which it has been sterilized. With a dressing forceps, it is carried to the fundus and the whole cavity filled. (Fig. 170.) The operator can better judge of the thoroughness of his work if he applies one hand externally



Fig. 168. - Bimanual compression of the uterus in postpartum hemorrhage. (After Bumm.)

to the fundus while packing with the other. The amount of material needed will vary from five to eight yards of handbreadth iodized gauze. The tampon should remain undisturbed for twenty-four hours, and then be cautiously removed.

After hemorrhage has been checked, it is essential that the uterus remain contracted for at least two hours. Pressure with the hand,



the application of a firm binder, or the overlaying of the uterus with a bag of sand, are some of the available means for maintaining such compression.

**Combating the Anemia.**—If the amount of blood lost has been moderate, it requires no particular consideration other than the free use of liquids, such as coffee, tea, milk, wine, and water given

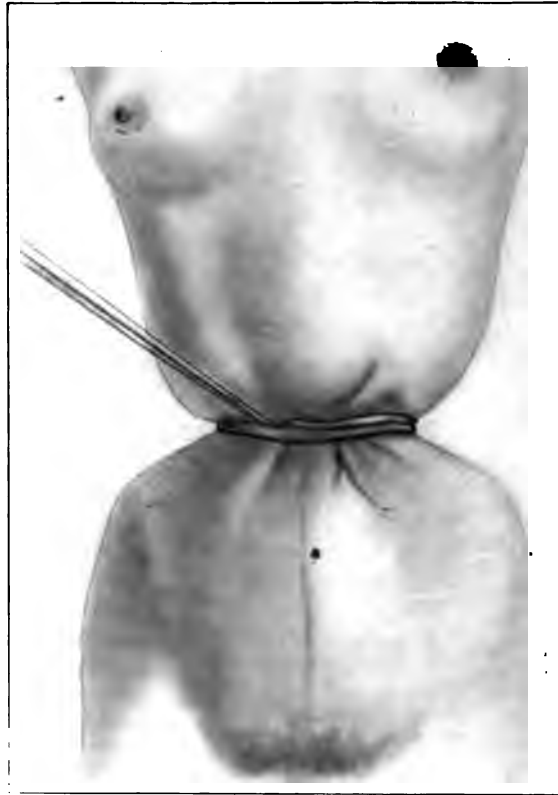


Fig. 169. Constriction of the waist with the Momburg tube to control hemorrhage.

to drink. But when the hemorrhage has been great, the pulse small and rapid (120) or lost altogether; when the patient cries for air, complaining that the room is close, and that she is nauseated and faint, then the anemia presents serious aspects, and calls for more active treatment.

First of all, the head should be lowered, the pillow taken away,

and the foot of the bed elevated. Bodily heat may be maintained by means of hot water bottles and other warm objects placed about the patient.

Next to be considered is the blood and its speedy restoration.

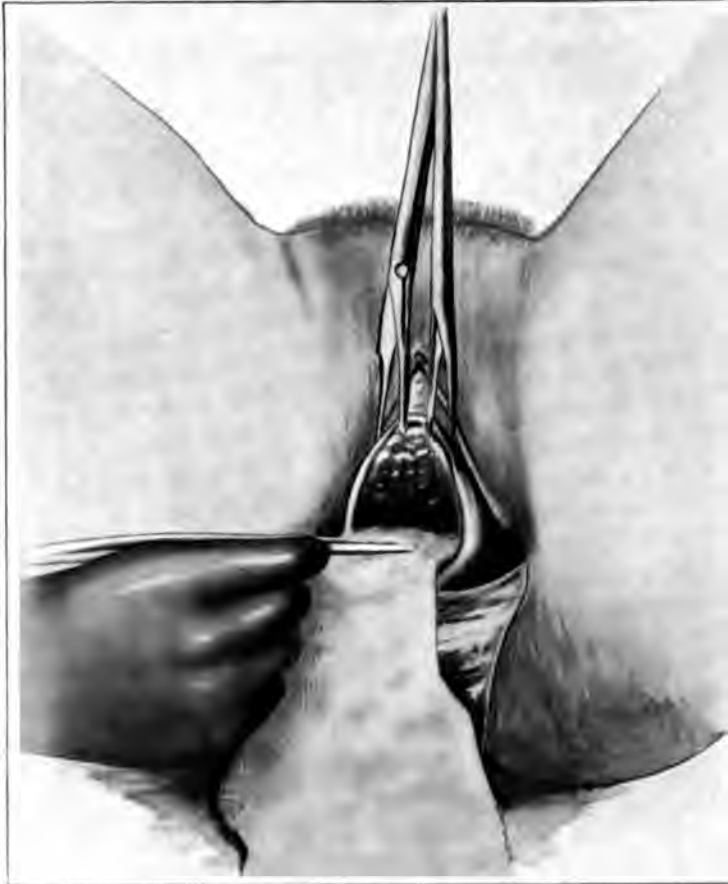


Fig. 170.— Packing the uterus with gauze.

For this purpose one frequently makes use of saline infusion, introducing the solution either subcutaneously or per rectum. In the hospital the necessary apparatus for carrying out one or the other of these procedures is at hand, and little time need be lost; but in outside practice the obstetrician may be obliged to impro-

vise some of the things required. He should, therefore, always have ready in his satchel an infusion cannula, a yard or more of rubber tubing, a metal funnel, and several six-gram powders of salt. (One such powder added to one liter of water makes a solution of the proper strength.) After their sterilization, the cannula, tubing, and funnel are connected, and the solution introduced by gravitation into the region beneath the mammæ. Other



Fig. 171.--Introducing normal salt solution into the basilic vein by the gravity method. (Redrawn from Edgar.)

areas than this are sometimes chosen, but they are less comfortable when injected and more inaccessible to manipulation. The procedure of hypodermoclysis is simple, yet one seldom sees it carried out without a break in the technic: the connections come apart, the needle becomes plugged, the tubing leaks, or the solution is too hot or too cold. All this could be obviated if a little more care were

taken to see that everything is in working order before undertaking the operation. Hypodermoclysis once well started requires no further manipulation, except, perhaps a little gentle massage of the infiltrated area to favor absorption and to relieve the tumefaction of the parts. The whole process should, of course, be carried out as aseptically as possible; otherwise it may be followed by the development of a phlegmon at the site of injection, or, perhaps, may end in a general infection. It is also important that the needle be made to enter the subcutaneous tissue. To infiltrate

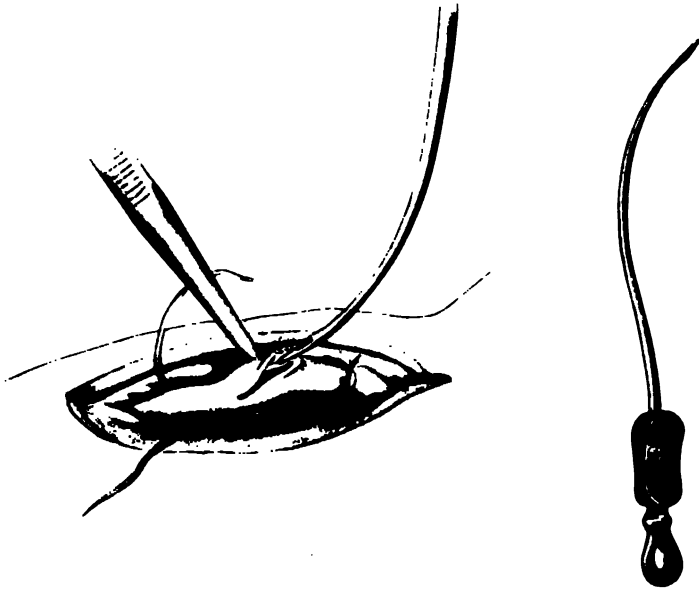


Fig. 172. Basilic vein prepared for infusion, and the cannula.

the skin may cause its necrosis. When properly infused, the introduced fluid is quickly absorbed. A similar but less prompt effect is obtained by injecting the solution into the rectum. And, in suitable cases, infusion of normal saline into a vein or possibly, the transfusion of blood acts even better than either. The object of all such therapy is to tide the patient over the crisis of acute anemia. The danger past, regeneration of the blood rapidly takes place.

An altogether different method of temporarily supporting the

vital centers is that of utilizing the blood of one part to buoy up another. The process is spoken of as autotransfusion. It is accomplished by compression. One or both extremities are tightly bound from the toes to the groin with an Esmarch bandage, shutting off for the time being less important areas in order that the more vital centers may be safeguarded. The procedure is ex-

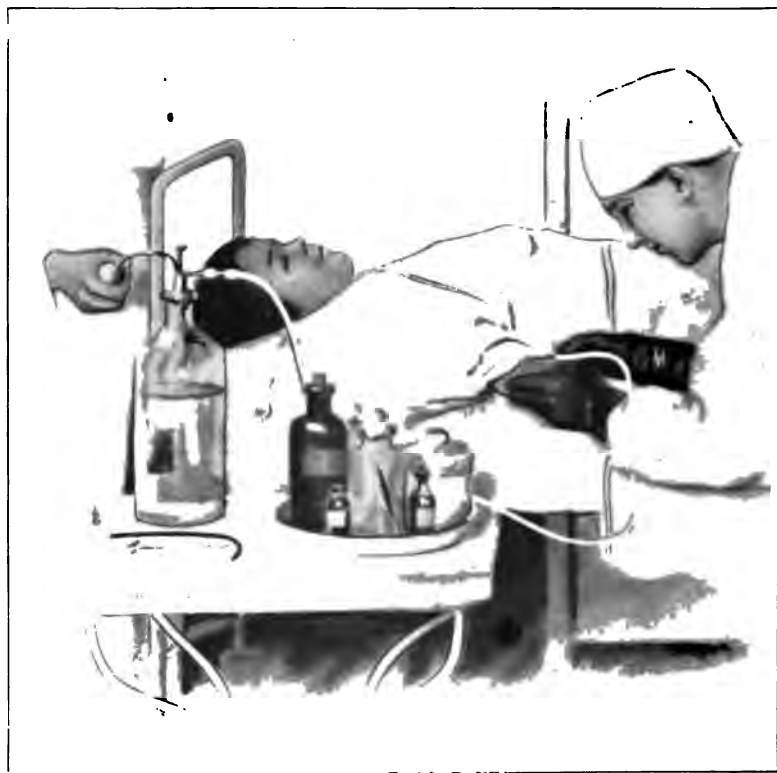


Fig. 173. -Introducing normal salt solution into the basilic vein by the air-pressure method. (Redrawn from Shears.)

ceedingly painful and should not be continued for more than two hours. If maintained for a longer period, the constriction may result in serious injury to the soft tissues, especially the nerves. And in releasing the pressure there is some risk of producing harmful hyperemia in the extremity with collapse of the patient if the volume of blood in the isolated area is restored too suddenly. It

should be reestablished slowly. The procedure is one of considerable utility and easily carried out, but it is not altogether free from danger, and should not be employed except in an emergency.

Atony and anemia rarely prove fatal in childbirth, if the delivery, especially of the placenta, has been under an obstetrician's personal supervision. But unfortunately, it sometimes happens that one sees these cases for the first time after severe hemorrhage has taken place, when atony and anemia have become too profound to respond to restorative measures. Even then hope is not altogether lost, for the individual resistance of the patient may save her. A person whose health is otherwise good rarely dies from postpartum hemorrhage, and the rapidity with which blood is regenerated in such patients is truly remarkable.

## CHAPTER XVI

### RUPTURE OF THE UTERUS

#### ETIOLOGY

The structure of the uterus is such that during the process of birth, it propels its contents along the path of least resistance, which is the cervical portion. Great as this resistance may be, if given time, it will yield, and, when fully opened, will permit the child to pass. Accompanying the dilatation, and as a part of the process, the outlet to the uterus undergoes a marked structural attenuation. In some respects it is like the opening of a sphincter muscle, differing from such action chiefly in that it acts more slowly. If now the forces of expulsion are too great, or some mechanical obstruction interposes, the uterus continues stretching until it reaches its limitation at some weak point, when the wall gives way.

There is less resistance in the wall of the uterus, and a greater tendency to tear, in subsequent than in first births. About ninety per cent of the ruptures occur in multiparous women.

In 203 cases rupture was due to the following causes, or at least, the following were the prominent factors in its causation. (Mertz):

- Pelvic contraction in 70 cases.
- Cross birth in 26 cases.
- Hydrocephalus in 26 cases.
- Large child with an unfavorable presentation  
of the head in 18 cases.
- Scar formation in the birth canal in 10 cases.
- Pelvic tumor of some kind in 3 cases.
- Cause unknown in 70 cases.

While it probably is true that an anatomic disproportion is primarily responsible for rupture, the injury will, in at least one-third of the cases, be the direct result of operative violence;

and the operation most frequently responsible is that of version. The wedge-like action of the hand and arm as they are forced between the fetus and the wall of the uterus in search of a foot; the manual correction of abnormal presentations of the head (face, brow, chin); the employment of the metreurynter,



Fig. 174.—Rupture of the gravid uterus (postmortem section). On the posterior surface of the uterus in its lower segment, the head of the fetus is seen protruding through a rupture in the wall. (After Zangemeister.)

especially if the uterus is not able, in addition to its own contents, to bear the increased pressure of the distended bag; embryotomy, forceps, or even an examination, if pursued with violence—any one of these procedures may cause rupture.

During gestation or at the beginning of labor, rupture can occur



only when some pathologic condition in the uterus accompanies the pregnancy, when degenerative change, marked atrophy, or scar formation have greatly impaired the elasticity of the tissues. Hydrocephalus, also, may be responsible for rupture early in labor since the presence of the abnormally large head has already served to thin out the lower segment to a dangerous degree.

**Symptoms.**—If the uterus is about to rupture, symptoms of



Fig. 175.—Complete rupture of the uterus. The tear is through the lower segment and the upper part of the cervix. (Redrawn from Hammerschlag.)

a threatening nature are often to be observed. The rhythm of labor becomes disturbed by the unequal and futile struggle going on, the pains following one another so rapidly that no interval of rest is allowed the patient; the abdomen grows rigid and sensitive to touch, especially over the hypogastrium; and the pulse becomes rapid and small. Occasionally, the fetal parts as they approach the surface through the thinned wall of the uterus, can be

felt with unusual distinctness, the round ligaments feel like cords, and the ring of Bandl courses high over the abdomen.

The occurrence of a rupture is generally recognized by the patient herself. It comes like a blow, and is accompanied with severe pain and hemorrhage. The advancing part, which heretofore remained fixed in the pelvis, now becomes movable and, if the rupture is complete, disappears altogether. Labor ceases at once, and the woman's condition assumes a grave aspect. A very signifi-



Fig. 176. A tear through the cervicovaginal commissure, following version and extraction. (Redrawn from Hammerschlag.)

cant sign is sometimes to be made out with the hand. Applied to the abdomen, the sudden relaxation of the tissues and the ease with which fetal parts may be palpated, are quite convincing proof that rupture has taken place. If rupture occurs gradually, labor does not stop so suddenly, the peritoneal irritation is less severe, and the advancing part does not recede. Shock and anemia, too, are less profound.

A laceration of the uterus almost always begins in the lower

segment. From there it may extend upward to the fundus or downward into the vagina. It may take place in the anterior, posterior, or lateral wall of the uterus, and may be lengthwise, crosswise, or oblique in its course.

In three-fourths of all cases of rupture the tear includes all the layers of the uterine wall; in the other fourth the peritoneum over the rupture remains intact. In the complete form, hemorrhage takes place into the free abdominal cavity, and the fetus and placenta either protrude through the rent, or are entirely expelled into the abdomen. In the incomplete variety, the blood becomes extravasated into the connective tissue under the peritoneum, forming large hematomata, which may extend to the region of the kidney. Through the entrance of air, an emphysema may develop in the same way.

The localization of a tear depends on the connection it has with a contiguous organ, especially the bladder, which is frequently torn into.

### DIAGNOSIS

The diagnosis of rupture is based on the sudden cessation of labor, the intense pain, the hemorrhage, the recession of the fetal parts, and the general collapse of the patient. Further proof of rupture is to be found in the altered posture of the fetus and the objective changes in the mother's abdomen. The child can be palpated with astonishing ease, while the emptied uterus lies as a hard tumor close beside the fetal head. Internally, the fetus is found wholly or partially expelled from the uterus, the lacerated margins of the rupture having a distinctly jagged outline. In making such an examination, one is admonished to proceed with great precaution in order not to tear apart the still intact peritoneum, for rough handling may convert an incomplete into a complete rupture.

### PROGNOSIS

The chief danger to the mother comes from hemorrhage and puerperal peritonitis. And since this last complication is more likely to occur if the peritoneum be broken, the prognosis is worse in the complete than in the incomplete rupture. The one has a

mortality of about seventy per cent, the other about fifty per cent. For the child, the outlook is exceedingly bad, especially in the spontaneous complete rupture with expulsion of the fetus into the abdominal cavity. It is practically always fatal.

The prognosis as regards the subsequent condition of the pelvic viscera is also bad if the reparations are accompanied by parametric and peritonitic exudates. The consequent adhesions and scar formations make it, in this way, quite possible for the uterus to rupture again should pregnancy be repeated.

### TREATMENT

The first and most important point in the consideration of such injuries is prophylaxis. In every obstetric situation that threatens the integrity of the uterus the most careful and painstaking observations should be made in order not to overlook the signs of impending rupture. If rupture seems imminent, immediate delivery is indicated; and, when possible, the child should be delivered without attempting to change its position, version especially being very dangerous under such circumstances. Very likely some form of embryotomy will have to be performed. In a contracted pelvis, pubiotomy and cesarean section are operations that merit consideration.

In case rupture has already occurred, delivery, again, is the thing to undertake. If still within the uterus, the child may be extracted by the feet, with forceps, or through perforation and cranioclasia, all depending on the position of the child and the feasibility of one or the other of these methods being carried out. If it is found that the child lies partly within and partly without the uterus, it may still be possible to deliver, especially if a foot can be grasped without increasing the danger of extending the laceration. On the other hand, if the child lies completely without the uterus in the cavity of the abdomen, it is not permissible to try to bring it back through the rupture, first, because the danger of infection is too great, and, second, because the tear in the uterus is likely to be extended. The safer and better way is to open the abdomen, deliver the fetus and placenta, and sew up the rent in the uterus. If sepsis does not supervene, recovery may be confidently expected. Further treatment demands absolute rest in bed, the application of

an ice bag to the abdomen, and the administration of opium (tincture of opium, 10-15 drops, t. i. d., for two days). If hemorrhage continues after the child has been removed, particularly if its delivery is through the natural passages, the vagina is opened with a speculum, the cervix grasped with vulsella, and the uterus packed with iodoform gauze. All this must be done cautiously, for fear of making a complete rupture out of one that is incomplete, and thus greatly complicate the situation. For a few hours the fixation forceps may be left in place, since the next step in the efforts to stop bleeding may require the ligation of the uterine arteries; and to have the vulsella in position is obviously of material advantage. In combating hemorrhage, should it continue after tamponing the uterus, it will be found helpful to lay a ring of gauze about the uterus externally, and hold it there firmly with a binder or with a bag of sand. The elastic ligature of Momburg, already referred to in connection with postpartum hemorrhage, may similarly be of service in temporarily checking the flow of blood. Even the pressure of the hand, when applied directly over the aorta, serves the same purpose. One should not forget this, and waste precious moments adjusting ligatures and bandages when a little pressure with the thumb in the right place will serve the purpose. As soon as bleeding has been brought under control, attention should be given to the anemia and its relief. (For the treatment of Anemia, see page 302.)

The tampon should be left undisturbed for thirty-six to forty-eight hours. Danger from hemorrhage is practically over by then, and, if the patient escapes infection, her recovery is usually rapid. Peritoneal infection is not greatly to be feared if the injury is of the incomplete form; but, unfortunately, one does not always know the extent of the lesion and the unwelcome situation sometimes presents itself of peritonitis setting in after the patient has recovered from the earlier dangers from shock and hemorrhage.

Success in the management of rupture depends a great deal on where the patient happens to be when the accident occurs. In her own home, without immediate and competent help, it becomes grave; in a well-appointed hospital, where good assistance is available, the outlook is far from hopeless.

In slight lacerations the serosa is brought together with a continuous suture of catgut, or, if the rent is large enough to admit of

it, the wall may be closed in layers as in cesarean section. An extensive transverse tear, especially if it involves the bladder, may require amputation or, possibly, complete removal of the uterus.

After all, the results are no better when treated by section than may be expected when only the tampon is used. Indeed, one is hardly justified in opening the abdomen except in complete rupture of the uterus, and perhaps not then if hemorrhage can be controlled by packing. If the abdomen must be opened for purposes of delivery, or if a prolapse of the intestines can not be reduced through the vagina, or the rupture involves a neighboring organ, then a laparotomy becomes necessary. Undoubtedly, the woman's best interests will be considered if the cavity of the uterus is packed as recommended, and surgical procedures resorted to only when they become positively indicated. A spontaneous rupture occurring during pregnancy or at the onset of labor, would, obviously, have to be treated intraabdominally.

## CHAPTER XVII

### LACERATIONS OF THE CERVIX

Lacerations of the cervix are relatively common. Indeed, it is hardly possible to escape them; but for the most part such injuries are not extensive enough to require surgical attention. The more serious ones come from rapid dilatation, whether this be due to the rapid passage of the child, the forcible introduction of the obstetrician's hand, divulsion with powerful instruments, or the improper use of hydrostatic bags. The tear is most likely to occur if the tissues themselves have lost their elasticity, that is, if their normal quality of stretching without tearing has become impaired. Placenta previa, for example, can so alter the character of the cervix in this respect that it will give way under what otherwise would be harmless force.

Lacerations of the cervix are almost always longitudinal, extending along one or both sides of the canal. Tears which include only the intravaginal part of the cervix, ending short of the vault, have little significance, since no large vessels are involved, and the danger from infection extending upward into the pelvis is slight. But lacerations which reach into the parametrium become serious, even dangerous to life.

The hemorrhage from a laceration generally makes its first appearance immediately after the child is born, its extremities often being covered with blood. Until then the advancing part prevents by pressure any serious bleeding taking place. The blood is bright red, and flows continuously, although the uterus remains contracted.

The bleeding is not always external. It may extend into the broad ligaments, and there form hematomata; or a thrombus may develop at the point of rupture only to give way in the puerperium.

A laceration may be so extensive as to involve the ureters and cause fistulae, uterovaginal, or even uteroureteral.

Parametric exudates, scar formations, malpositions, and other gynecologic conditions often date their beginning from a cervical laceration accompanying childbirth.

In determining the extent of a laceration, very little information can be gained from palpation alone; actual inspection of the parts must be made.

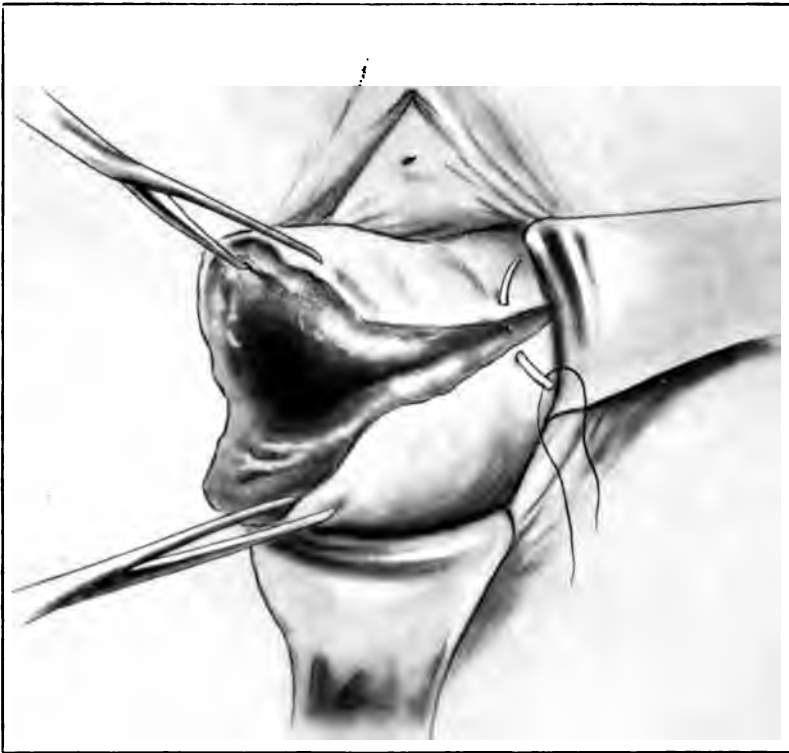


Fig. 177. Suturing the lacerated cervix.

**Repairing the Torn Cervix.** A tear that is not accompanied by hemorrhage, requires no treatment; one that is, should be sutured or packed at once. In general practice packing is easier than suturing, and in most cases it is quite sufficient. Even a laceration into the supravaginal tissue had better be treated in this way unless one has hospital facilities at hand. Repair (Fig. 177) of an injury of this character is made as follows: After careful but rapid



disinfection, the cervix is exposed by speculum, grasped with vulsella and brought to the introitus. The vesicouterine fold is separated, and the bladder pushed up out of the way, much the same as in proceeding with vaginal cesarean section, already described. The tear is now exposed in its entirety, and closed with catgut. If there is bleeding from the uterine arteries, their ligation becomes necessary. Closing the vaginal wall completes the operation.

### PROGNOSIS

The prognosis is always serious when the laceration extends into the supravaginal tissue, where important vessels are likely to be torn. The simpler injuries are not accompanied by much danger; but, inasmuch as one can never know how extensive a laceration may be without investigation, it is wise to examine the cervix after every delivery. The influence of infection, too, must be considered in the prognosis, for very often puerperal morbidity, subinvolution, and permanent ill health may follow from it.

## CHAPTER XVIII

### LACERATIONS OF THE VAGINA

#### ETIOLOGY

Carried beyond its limitations, the stretched and attenuated vagina, like other parturient structures, will give way. The separation generally takes place at its junction with the uterus, either in front or behind the cervix, but it can be so extensive as to tear loose in its whole circumference. Brief mention of such a case follows:

Some years before I saw her, an Italian woman underwent an ordeal so serious that a complete atresia of the vagina followed her delivery. Just what occurred during labor, I am unable to say. From her husband I learned that after a midwife and several doctors had exhausted themselves in their attempts to deliver her, she was taken to the hospital where an embryotomy was performed. In all probability the uterovaginal attachment was torn loose, for at the time I first saw her the vault was sealed over so completely with scar formations that no opening into the uterus could be found, nor could one be made out from within the abdomen when she was operated on later.

The forces responsible for lacerations of the vagina are the same as cause rupture of the uterus and severe tears of the cervix; and, as in those injuries, the seriousness of the laceration depends largely on the degree of peritoneal involvement. Falling short of this structure, a tear in the vagina has few serious aspects. Occurring in the course of a spontaneous birth, lacerations of the vagina have no particular significance. It is only when produced through forcible introduction of the hand or violent operative procedures that they become serious. Certain movements in delivering with forceps, such as oscillation and rotation, made by the accoucheur in his efforts to dislodge an obdurate fetus, or the improper introduction of the forceps blades, are accountable for much of the harm done. A bungling operator may even force the blades through the vagina into the peritoneal cavity.

The part of the canal most likely to suffer injury is the outlet, the consideration of which will be taken up a little further on.

Severance of the bony arch, as in pubiotomy, is sure to be followed by more or less trauma, not only of the vagina, but also of the bladder and urethra.

Venous stasis, due to long-continued pressure of the head, may be followed in rare instances by laceration of the vessels with formation of hematomata.

### SYMPTOMS

The overstretched and torn vagina gives rise to symptoms similar to those of ruptured uterus, differing only in their gravity; the pain ceases more gradually, the bleeding is less profuse, the collapse

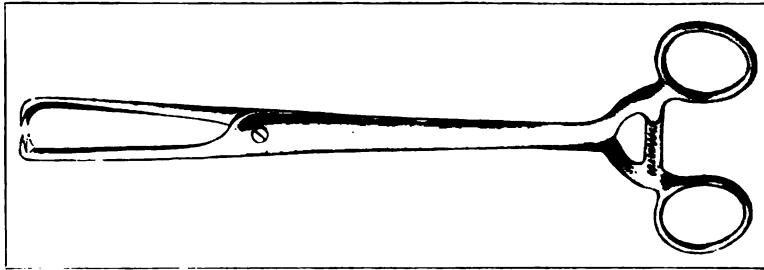


Fig. 178. -The claw forceps.

is less marked. As in the other injury, the child may escape into the abdominal cavity. The presence of urine and feces in the wound furnishes unmistakable evidence that the bladder and rectum have become torn.

Where lacerations are directly due to the use of instruments, hemorrhage is generally perceived at once, but in spontaneous tears the bleeding may not appear until after the child has been delivered; or, instead of showing externally, the hemorrhage may take place into the paravaginal tissue, with development of hematomata. Such tumors, besides being very painful, may be so extensive as to reduce considerably the lumen of the canal.

### DIAGNOSIS

If blood first appears during an operative procedure, one is led to conclude that the operation itself is the cause of the hemorrhage; if it appears only upon the delivery of the child, it is presumed to be due to injury of the cervix. One is not always able to learn the source of hemorrhage by palpation alone; indeed, it is often necessary, and generally more satisfactory, at once to inspect the parts through a speculum.

When the laceration extends into the bladder or rectum, there is immediate discharge of urine or feces into the vagina. The opening may be large enough to admit the finger, in which case the diagnosis is made easy. In other cases a speculum will be needed to expose the torn surfaces before one can say whether it is urine or feces that escapes. Later, after some days or weeks, the more delicate means of diagnosis by cystoscopy may be employed; or the older, but quite satisfactory, method of injecting milk into the bladder and observing the point of its escape, may be tried. Exact diagnosis, however, would better be deferred until the puerperium is well over, when the tissues can be put on the stretch and the damaged structures thoroughly inspected.

A rare laceration of the retrovaginal septum may come from the unwarranted practice of introducing the finger into the rectum to press out the head.

### TREATMENT

Careful inspection is made with the help of a speculum and a lateral retractor. All spurting vessels are clamped and ligated, and the torn edges brought together with catgut. If the laceration extends far up the canal, pressure on the fundus from the outside is a harmless means of bringing the wounded area into better view. If the bladder or rectum is involved, their reparation requires better facilities and more competent assistance than otherwise would be necessary. Small openings of the bladder frequently close of themselves if the organ is kept quiescent, as may be done by the introduction of a self-retaining catheter. A cure for fistula should not be undertaken before the tissues have returned to normal, which only occurs after several weeks or months.

If one is not able to control hemorrhage by ligation, he should pack the uterus, as well as the vagina, with gauze.

A hematoma large enough to cause obstruction should be evacuated.

### PROGNOSIS

The prognosis is generally good, since the lacerations tend to heal readily. In the more serious forms, as when the vagina is torn loose from the uterus, the prognosis is no less grave than in rupture of the uterus itself. Infection is followed by pus formation and inflammation, which may extend into the paravaginal and parametric tissue, leaving in its wake scar formations and other gynecologic ailments to be fastened on the patient.

## CHAPTER XIX

### PRESSURE INJURIES OF THE CERVIX AND VAGINA

#### DIAGNOSIS

A pressure injury can not be diagnosed at the time of labor. An increasing edema of the cervix with blood-stained urine, following a prolonged arrest of the head, points toward it with con-

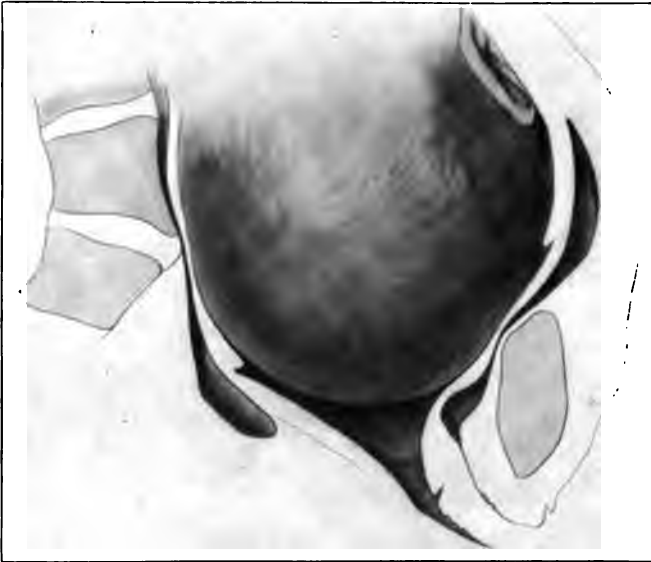


Fig. 179. Illustrates how, in prolonged arrest of the head, pressure against the bony prominences of the pelvis may be the cause of local necrosis of the intervening structures, and the development of fistulae.

siderable certainty, and one can only conclude that injury is impending from basing his fears on experience. Later, when urine or feces makes its appearance in the vagina, a positive diagnosis becomes easy. If the pressure involves a large area of the anterior wall, so that a considerable portion of the vaginal support is lost, a vaulting downward and forward of the bladder takes place

through the opening, showing itself as a reddish tumor at the vulva. In some instances such a displacement may be so great as to bring the ureters into view.

### **TREATMENT**

In a prolonged labor frequent examinations, both external and internal, should be made, in order to determine whether the head remains fixed; for if it does, and edema of the cervix, bloody urine, and swelling of the vulva follow, the condition must be relieved or pressure necrosis will result. The injury having occurred, it is best to defer reparation for at least two months. This is necessary in order to give nature time to complete her part of the regenerative process.

### **PROGNOSIS**

As far as life is concerned, the prognosis is good; but as regards the parts themselves the outlook is not particularly promising. Instead, prolonged illness, repeated operations, severe scar formations, and, eventually, chronic invalidism are some of the unwelcome sequelæ to be dreaded in injuries of this nature.

## CHAPTER XX

### INJURIES OF THE VULVA AND PERINEUM

#### ETIOLOGY

While all the structures of the birth canal are exposed to injury, the parts most likely to suffer are those in and around the perineum (Fig. 180). Apparently the genital cleft is inadequate, and one never ceases to marvel that a child can pass through it without doing harm to its component structures; and, for that matter, it can not. The fact that subsequent births are shorter and easier than the first is proof that the tissues have suffered from the process, and that their competency thereby has become impaired. However, it is not intended to dwell on the remote effects of parturition; only its immediate and demonstrable lesions now concern us.

The causes of injury to the vulva and perineum are much the same as the causes of injury to the cervix and vagina. Especially in first births is the contracted introitus liable to be torn. The rapidity with which birth takes place is also a factor. The tissues themselves, too, vary, both from age and individually. Their elasticity may become impaired through pathologic alteration, such as sear formations, condylomata, edematous swelling, kraurosis, etc. Indirectly, an abnormal pelvic inclination, or a greatly contracted pubic arch, each of which gives the head an altered direction, may be responsible; and while an introital injury may be spontaneous, there is no doubt but an instrumental delivery adds to the danger. Much depends, of course, on the skill and judgment of the operator; but the introduction of the hand, the extraction of the breech, the freeing of the arms, the delivery of the after-coming head, the use of forceps, in fact any of these procedures, whether skillfully executed or not, increases the risks.

#### COURSE AND SYMPTOMS

Most of the aforementioned injuries befall the structures of the pelvic floor and perineum. The giving way of the latter may be ob-



served as it takes place, but the giving way of the former is not so easily made out; and it is not possible when made out to say how extensive the damage may be until later.

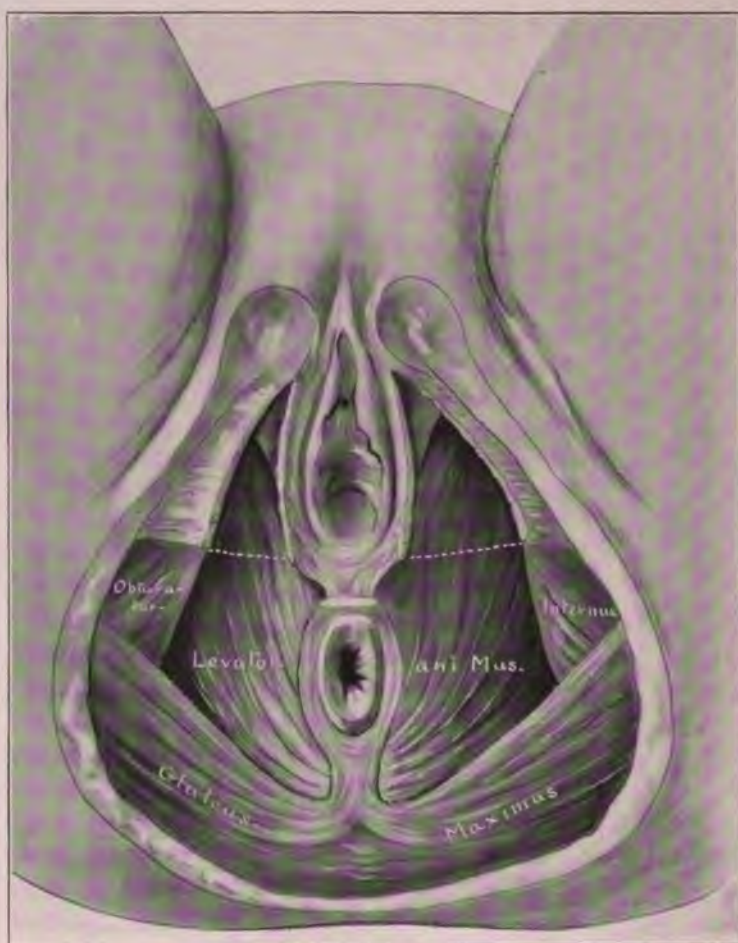


Fig. 180.—The levator ani muscle. (From Döderlein and Krönig.)

A laceration is spoken of as complete when the rupture includes the external sphincter of the anus, and incomplete when it stops short of it. Of the latter there can be many degrees,—from the smallest tear of the fourchette to a rupture of all the structures

down to the sphincter. The complete tear may also include the anterior rectal wall.

The symptoms of introital trauma, other than hemorrhage, are slight. A burning sensation will generally be complained of, but very much the same pain may come from distention alone. And as for the hemorrhage, there is usually very little unless the laceration extends to the region of the clitoris, or involves large varicosities of the vulva. In tears that include the sphincter and there follow involuntary expulsion of flatus and feces per vaginam.

### DIAGNOSIS

After every delivery the whole lower birth canal should be carefully examined. To do this to the best advantage the patient should be placed crosswise on the bed with good light coming over the operator's shoulder. With sterile gauze the parts are sponged, inspected, and palpated for injuries. Besides noting the state of the perineum itself, three things should satisfactorily be demonstrated: (1) the source and amount of bleeding, (2) the condition of the vaginal wall, and (3) the competency of the sphincter and muscle. This last is determined by passing the exploring finger (cottoned) into the rectum.

### PROPHYLACTIC TREATMENT

**Reducing the Speed of Expulsion.**—When the forces of labor appear to be driving the child forward with too great speed, one way of safeguarding the perineum is by regulating or checking these forces, which is best accomplished with chloroform judiciously employed.

**Supporting the Perineum Manually.**—By applying the hand externally, the perineum is reinforced and the tissues supported. At the same time the lateral walls of the canal, as well as their median insertion, are given time to retract, and their dislocation forward is prevented.

**The Observance of Correct Mechanism.**—It is a well-known mechanical principle in obstetrics that the fetus naturally assumes the most favorable posture, and moves along the path of least resistance. In a normal birth, therefore, such adaptation is spontaneous

and requires little supervision. So far as the position of the patient is concerned, these principles can be applied whether she lie on the back or the side. The side position is recommended in spontaneous deliveries for the reason that the parts may more favorably be inspected, and both hands employed to advantage. Abdom-



Fig. 181.—Supporting the perineum in the lateral position.

inal pressure, too, can be somewhat better regulated and controlled. Usually, the position is not assumed until shortly before the end of labor, which may mean in one case only a few minutes and in another perhaps an hour. If the woman has borne other children, she is turned on the side when the head becomes visible

at the vulva; but, if she is in her first labor, it will be soon enough to take the lateral position if she waits until in the interim of a pain the head remains on the pelvic floor. As to which side the patient shall be turned, varies with the position of the child. Theoretically, she should lie on the left side in left positions of the head, and on the right side in right positions of the head; but practically it makes little difference on which side she lies. In fact some obstetricians prefer the left side no matter in what position the head may be.



Fig. 182.—Supporting the perineum in the dorsal position.

In delivering on the side, the buttocks are brought close to the edge of the bed with the legs and thighs flexed. The accoucheur sits or stands with his back toward the head of the bed. After the usual preparations for delivery have been made, the patient may be covered with a sterile sheet, which need not be lifted before the head reaches the vulva and not then, if the delivery is normally easy. With a sterile dry towel, some prefer a hot wet one, the pre-



senting head, the vulva, the perineum, and the anus are covered, and the open hand applied to the outside.

When the head of the child is about to pass the introital ring, an assistant lifts the patient's knee. This enables the accoucheur to

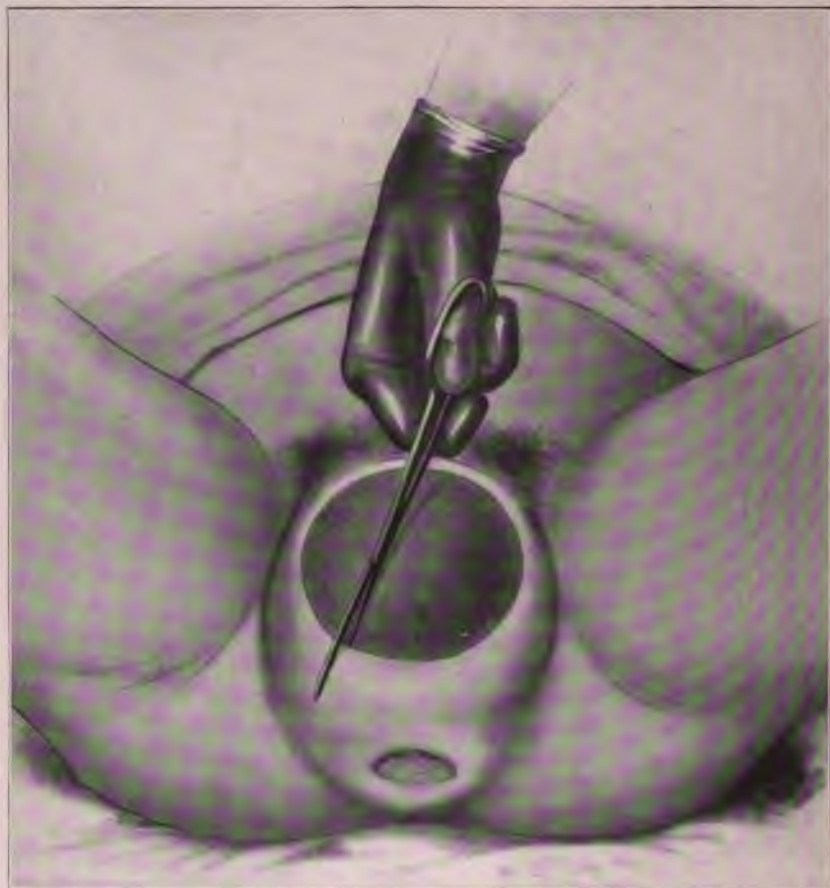


Fig. 183.—Episiotomy. Severing the introitus.

prevent with one hand the head from advancing too rapidly while the other is left free to operate in the region of the perineum, where he may with the thumb and fingers favor rotation or support the taut tissues (Fig. 181.)

It is proper in this connection to add that the technic of "sup-

porting the perineum" is not a clearly defined procedure. It may mean manipulation to one operator and chloroform to another. The essential thing is time, to let nature take its course, with just enough supervision to see that the tissues are not strained beyond what they can stand. Anesthesia is one of the greatest adjuncts to the obstetrician when the head is moving dangerously fast and delay is desired. On the whole, chloroform is quicker and more

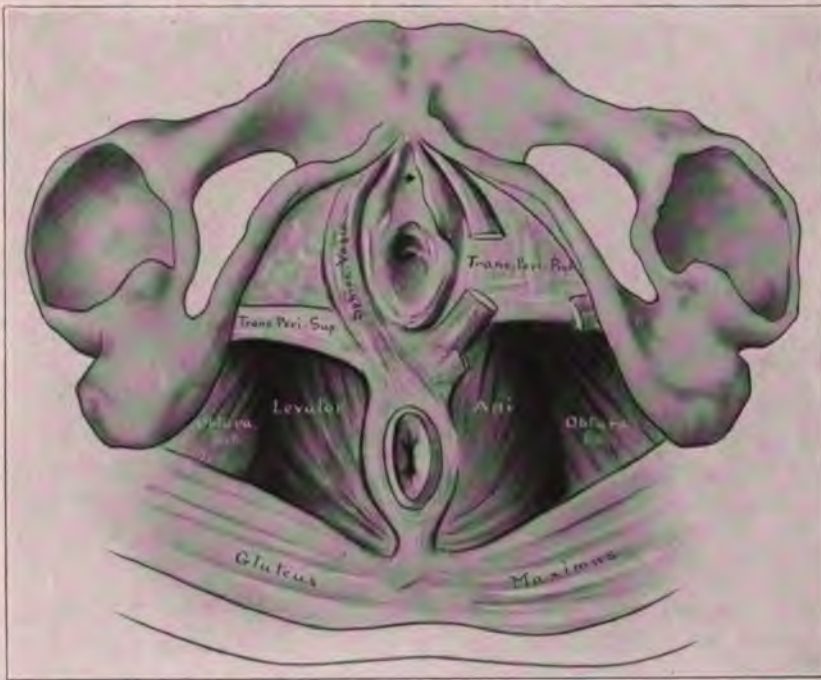


Fig. 184. —Topography of the pelvic floor and introitus. (Redrawn from Döderlein and Krönig's *Operative Gynecology*.)

lasting in its effect than ether; but the latter is known to be safer and somewhat more stimulating. Neither is accompanied by ill effects when given to the obstetric degree of narcosis.

While the lateral position is often preferred, the dorsal position in most cases is satisfactory, especially in the multipara with a relaxed outlet. Standing or sitting by the patient's side, if she lie lengthwise on the bed, or facing her if crosswise, one hand is laid over the vertex, the other supports the perineum (Fig. 182). This

is also the more favorable position of the two, lateral and dorsal, if much difficulty is experienced in the delivery of the shoulders.

If one is compelled to interfere before the tissues have been stretched, and especially if they are rigid and unyielding, a colpeurynter of moderate size may be drawn several times through the parts. If it appears unavoidable or improbable that the perineum will escape laceration, a prophylactic vaginoperineal incision is indicated. With a strong pair of straight scissors a cut is made at one side of the middle line in the direction of the tuber ischii (Fig. 183). With the first snip of the scissors the skin is usually the only part cut, exposing the white glistening fascia beneath. A second bite includes the fascia and the *transversus perinei* and *sphincter vaginae* muscles (Fig. 184). The length of the incision should be individualized, but it is better to make it a little too long than too short; otherwise it serves the undesirable purpose of being a starting point for an extensive tear. The section serves a double purpose. First and foremost, it prevents a complete tear of the sphincter ani; and, second, it provides room for the carrying out of the operative procedures, particularly the vaginal cesarean section.

### REPARATION

To allow healing without suturing ends in functional incompetence, and is generally followed by abnormalities that furnish many of the regrettable consequences of childbearing. The complete tear is accompanied by the involuntary escape through the vagina of intestinal gases and feces, a most intolerable condition. Repair also becomes necessary, sometimes, because of the arterial hemorrhage which may follow the laceration.

The following instruments are required: needles, needle holder, tissue forceps, scissors, and two or three artery clamps. For suturing, material must be used that will hold the parts in position for at least five or six days. Catgut sometimes fails to do this, and therefore does not meet the requirements as well as a nonabsorbable material such as silkworm. Besides instruments and sutures, a good supply of sterile gauze sponges will be needed.

Shall the patient be anesthetized? So much depends on the individual case that no fixed rule can be established. She must,

however, remain quiet while the stitches are being placed, and unless she can do this it is better to give an anesthetic. Very often the parts are so benumbed from the stretching they have undergone that one or two stitches can be placed without causing much additional pain. In case the injuries should be more extensive than is apparent from casual inspection, it is more satisfactory to have the patient narcotized while the manipulations of examination and suturing are going on.

If the tear is well-defined, sutures may be introduced before the placenta comes away, tying being deferred until afterward. Commonly, repairs are not undertaken before the third stage of labor is over, and there are those who advocate delay still longer, even to five and six days postpartum. One reason for postponement is, that oftentimes labor comes to an end at an hour when light is poor and the facilities for doing painstaking work are bad. Another, and not altogether inadequate, reason is, that both patient and physician may be too spent with the severity of the case to undertake at once any further operative procedure. Perhaps the best reason for waiting, however, is that, after twenty-four to forty-eight hours, the recession changes will have so altered the relations of the parts that what seemed an extensive injury immediately after delivery may now appear of less consequence. At any rate, the laceration can be outlined more accurately. Personally, I am of the opinion that it is an advantage to repair the injury as soon as it occurs, providing none of the conditions referred to above, such as poor light, fatigue, or inadequate assistance, makes it impossible for the surgeon to do the work properly.

**The Incomplete Tear of the Perineum.**—The patient is brought to the edge of the bed or placed on the operating table, the thighs flexed and the knees supported. The extent of the injury is determined, and all bleeding arteries clamped and ligated.

The first suture is introduced at the upper angle of the injury. This point is brought fairly well into view by spreading the posterior wall of the vagina with the index and second fingers of the left hand; but to have the anterior wall held up by a retractor in addition is a marked advantage. A very useful device for exposing the surfaces to be united, and for holding the vulva apart while the sutures are being placed, is the instrument designed by Dr. Gelpi (Fig. 185).



the vaginal tear is closed as far as the touchette. If the laceration extends into both sulci, both are sutured. Many complicated methods for bringing the torn perineum together have been devised, but the simpler ways are satisfac-



Fig. 10. Closure of the vaginal tear with the touchette.

ing. Take a little longer to introduce them, but they are more dependable.

Beginning at the upper angle, the vaginal tear is closed as far as the touchette. If the laceration extends into both sulci, both are sutured. Many complicated methods for bringing the torn perineum together have been devised, but the simpler ways are satisfac-

tory, and no others will be described. The one thing to bear in mind is, that the needle must be carried to the bottom of the tear; otherwise an open space will be left, which is not only unfavorable for union, but invites pathogenic activity (Fig. 186). In deep

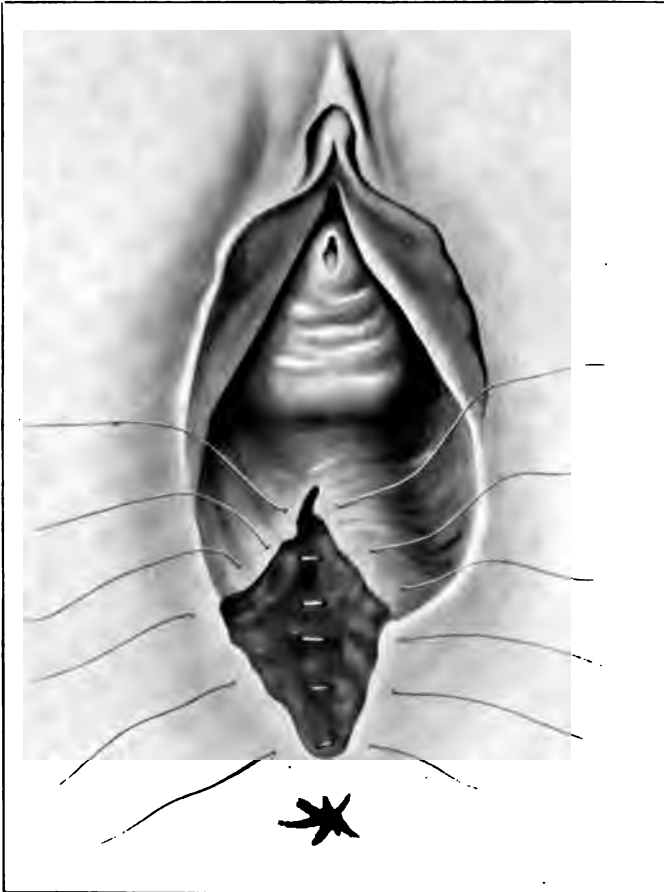


Fig. 186.—Repairing the lacerated perineum (incomplete tear). The three upper sutures may be of catgut, but the three lower ones should be of silkworm.

lacerations of the pelvic floor it is good practice to introduce a few buried sutures to make sure that the torn muscles and fascia are again brought together. Finally, the skin surface is closed with a continuous suture of catgut.

Obviously, a wound in this region is exposed to unfavorable conditions for healing because of the discharges and the difficulty of applying protective dressings. Some attempt, however, should be made to preserve the parts from contamination. After the sutures have been placed, the surrounding parts are thoroughly cleansed and dried, and the perineum dusted with aristol or other water-proof powder. An absorbent pad is then placed over the vulva, and the knees are kept together. Subsequently the parts should be disturbed as little as possible. Even the external douche may be omitted for a few days, and the bowels left inactive. The bladder may be emptied by catheterization. On the fourth day the patient receives a purge of castor oil, to be repeated every second or third day. By the eighth to the tenth day healing is complete.

**The Complete Tear.**—If the laceration extends through the sphincter, repair becomes somewhat more complicated; but with good light and proper assistance it is not particularly difficult. In closing the bowel suturing is begun at the highest point of rupture and continued down to the anal orifice. The last stitch is near the mucocutaneous junction (Fig. 187). In placing these stitches one is particular not to include the mucous membrane of the rectum, first, because it might open a way to infection, and, second, the formation of a fistula will occasionally result. A series of these interrupted buried sutures, about 0.5 cm. apart, when placed in position, converts a complete into an incomplete tear, the further repair of which is the same as has been described under that caption. The after-treatment is essentially the same as lacerations of lesser degree, except that the bowels are left quiescent for a longer period. A purge is not given before the sixth day. Until then the diet should be so modified that feces are not likely to be formed in the rectum, even suppressing the desire to stool by administration of opium, ten drops of the tincture, several times a day.

**The Central Tear.**—The bridge of tissue in front is first cut. This makes an incomplete or a complete tear of the injury, as the case may be, which is then repaired after the manner already described.

**The Episiotomy Wound.**—The episiotomy wound assumes, after delivery, the most confusing form. When the incision is made, the introital ring is greatly stretched by the child's head. With the distending object gone, the wound becomes elongated at right

angles to the section; and, unless one considers carefully the natural relations, the mistake may be made of closing the wound in a way to leave the vulva gaping and distorted. The placing of the sutures, especially the first one, therefore, is most important (Fig. 188). Beginning at the mucocutaneous junction, the needle, which



Fig. 187. Repairing the lacerated perineum (complete tear). The torn sphincter is first brought together with buried interrupted catgut sutures. This converts the complete into an incomplete laceration, which is further repaired as in Fig. 186.

should be a curved one, is entered close to the margin of the cut, carried to the depth of the wound, and brought out at a corresponding point on the opposite side. A forceps is now fixed to its uncut ends and the suture drawn to one side. Two or three

stitches in the mucous surface and two or three in the skin are sufficient to reunite the severed parts. Brought together in this way the relations that obtained when the section was made are approximately restored. It is wise to have the first stitch one of silkworm; the others may be of catgut.

**Wounds About the Clitoris.**—When lacerations occur in the



Fig. 188.—Episiotomy. The first suture in place.

neighborhood of the clitoris the hemorrhage is usually severe. While one is making ready to repair this and other injuries, the bleeding may be controlled by a pad of sterile gauze pressed firmly against the symphysis. The precaution should be taken when repairing injuries in this region not to include the urethra in any of the sutures or ligatures. To make sure that no such accident

occurs, a catheter should be passed into the canal as a preliminary precaution.

**Atypical Lacerations of the Introitus.**—Small and superficial wounds of the mucous membrane require treatment only in the event of their bleeding too freely. The larger and deeper tears are always to be sutured; torn varicosities may require ligating.

### PROGNOSIS

The prognosis in all lacerations of the introitus, so far as life is concerned, is good. Fatalities are rare. Death from hemorrhage is hardly possible unless the patient is without competent help when the laceration takes place. Infection is generally limited to local suppuration, redness, and swelling, without becoming general. Should an abscess develop after a laceration has been repaired, it may be necessary to take out one or more of the stitches, in order to give the wound drainage.

The prognosis as regards anatomic restoration of the parts, is not altogether satisfactory. However skillful one may become in the reparation of such injuries the structures will never be quite so competent as they were before the injury took place; and to permit healing to pursue a spontaneous course, leads to scar formations, some of which may become exceedingly distressing. Generally speaking, however, lacerations in and about the vulva and perineum heal readily, and, when properly sutured, give rise to no functional disturbances. If, for any reason, they do not unite, an incomplete laceration of the perineum may again be sutured after ten or twelve days, the surfaces being first vivified with a sharp curet and the edges freshened with scissors. If no healing takes place in a complete rupture, it is best not to undertake a secondary operation before the expiration of eight or ten weeks postpartum. A small rectovaginal or rectoperineal fistula will oftentimes close if there is otherwise good union of the parts.

## CHAPTER XXI

### THE HEMORRHAGES OF CHILDBIRTH

The presence of blood in any appreciable degree, either before, during, or after the birth of the child, always indicates an abnormality: before labor, it may come from a misplaced placenta (*placenta previa*), or a normally placed placenta that has suffered partial detachment (*ablatio placentæ*); during labor, it may come from a laceration of the cervix or from a rupture of the uterus as well as from *placenta previa* and *ablatio placentæ*; after labor, it may come from a laceration of the cervix or vagina, or an inverted uterus, or it may come from the placental site. Since *placenta previa* is so much more frequently the cause of hemorrhage than any of those mentioned, it will be considered first.

#### PLACENTA PREVIA

A pregnancy complicated by *placenta previa* (Fig. 189) is one of the most serious conditions with which the obstetrician has to deal. Left to itself, it proves fatal in four out of five cases. But properly managed, not more than one in ten ends seriously for the mother. The danger comes from not being able to check the bleeding as the placenta is being torn from its connection. Ordinarily, as we know, this union is not broken until after the child is born, when it becomes possible for the uterus to lock up its intervillous spaces by action of its own muscle fiber. Bleeding generally starts before labor begins, but it does not often set in with any alarming regularity until afterward. The problem is to get the baby out of the uterus without losing either the mother or child, and to accomplish this is one of the big feats of midwifery. Rapid dilatation of the cervix by means of the branched dilator, the traction balloon, or even the hand, is a risky procedure inasmuch as it causes trauma of the tissues and aggravates the hemorrhage. Besides, the presence of such lesions so close to the placental site makes them par-



Fig. 189.—Complete or central placenta previa. (Redrawn from a photoengraving of Van Rymsdyke's drawing in the Hunterian Museum of Glasgow University.)



ticularly dangerous. Delivery by abdominal section avoids the lacerations, but the operation can be performed in only a limited number of cases. The patient's family is not willing, as a rule, to



Fig. 190.—Placenta previa; placenta, fetus, and amnion born intact at seven months.

subject the woman to so formidable a procedure; besides, the facilities for operating are not always at command. Therefore, most of the cases of placenta previa occurring in general practice will

have to be managed in other ways and in the homes of the patients.

### TREATMENT

**Draining the Amnion.**—To rupture the amniotic sac serves a double purpose in the management of placenta previa. With the amnion intact the force of the uterine contractions is exerted on the lower segment as a whole; but, if the sac is ruptured and the continuity of the amnion broken, instead of the whole lower segment being uniformly affected, other portions than that of the placental site will yield to the process of stretching and will in this way relieve some of the strain that otherwise would fall on the placental area. The other effect is, that after the amnion has emptied itself the contractions of the uterus are better able to drive the advancing part down against the bleeding segment and stop the hemorrhage. The advantages to be gained, however, are not always definite. For example, when a large section of the placenta comes to lie over the exit, the sac having been opened, hemorrhage goes on uncontrolled, particularly if the pains become weak or stop altogether. The procedure, then, of draining the amnion, is applicable (1) only when the portion of placenta that lies in front of the advancing part is small, as in placenta previa marginalis, and (2) when the pains are regular and strong. Nor is it always easy to get into the cavity of the amnion, even if the placenta lies to one side, since the procedure almost always becomes necessary before or at the beginning of labor when the cervix is still closed. In this case some preliminary dilating will need to be done, either with the fingers or with some mechanical device.

**Making Use of the Child's Body.**—The employment of the fetus itself to control hemorrhage, is an old and effective way of dealing with placenta previa. Any method whereby a part of the child can be held firmly against the loosened placenta, will serve to check its bleeding, but this can hardly be done in any other way than by getting hold of a foot and bringing it beyond the placenta (Fig. 193). Even then it is not enough, as a rule, to let the delivery go on spontaneously; slight but continuous traction should be made on the child's foot. Thus the leg, thigh, breech, and body in turn serve as parts of a dilating wedge that act as a tampon to the



Fig. 191.—The fetus, placenta, and amnion shown in Fig. 190 separated.

bleeding structures. If a foot presents, it may be drawn down with comparative ease; in head and transverse positions, version becomes necessary.

In placenta previa the uterine exit is more or less effectually occluded by a structure whose slightest disturbance leads to hemorrhage; and, while it is true that in almost every case of low implantation the bulk of the placenta lies more on one side than on the other, it is far from easy to say on which side it lies. The fact that when dilatation begins, the stronger side holds and the weaker side gives way, offers some clue as to the direction the fingers should take when searching for the amnion. If one is not able to get

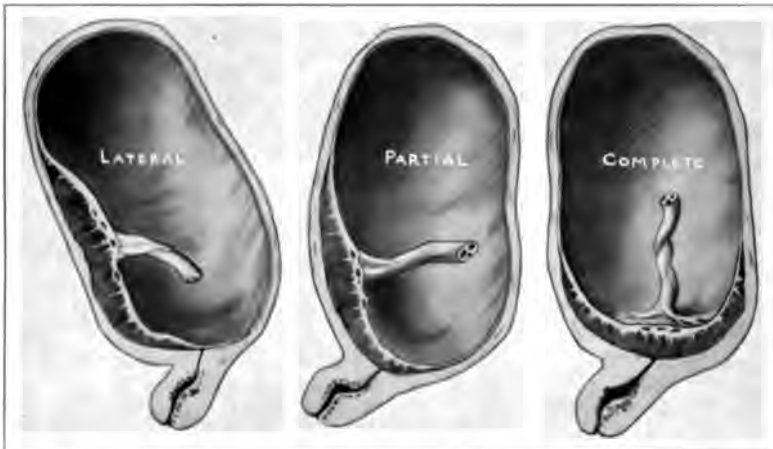


Fig. 122.—Lateral, partial, and complete placenta previa.

around the placenta in this way, the only alternative is to go directly through it.

Having succeeded in introducing two fingers, turning becomes comparatively easy; but there may be considerable difficulty experienced when it comes to getting the foot through the narrow cervix. If it already protrudes, matters are considerably simplified, especially if labor is in progress. But if labor has not yet begun, and bleeding becomes severe, gentle traction should be made. As soon as the head and arms have passed the os uteri, delivery is completed after the Veit-Smellie method.

The maternal mortality in cases managed after the manner de-

scribed is about 6.5 per cent; the fetal mortality is above 80 per cent.

**The Metreurynter.**—A cervix that will admit two fingers will permit the introduction of a hydrostatic bag, which is passed in a collapsed state into the cavity of the amnion, distended with sterile water, and a suitable weight attached. Two things are accomplished by it; bleeding is controlled, and dilatation effected. It



Fig. 193.—Bipolar version in placenta previa. (Bumm.)

may also serve another purpose, that of stimulating uterine contractions. So long as the metreurynter fits closely and firmly against the placenta, there can be but little hemorrhage, but when the cervical canal dilates to the size of the instrument, there will be renewed bleeding following its withdrawal unless the advancing part of the child descends and takes its place. This is hardly possible if the bag is a small one. In such case a small metreurynter should be followed quickly by one of larger size. When the canal has

become sufficiently dilated to allow the passage of the entire hand, delivery may be effected by version and extraction. Dealt with in this way, a child's chances are better than with combined version. Its disadvantages are, that the technic is more complicated, requiring greater care in preparation and more skill in the manipulation of instruments. When employed in placenta previa centralis, the metreurynter in a collapsed state and held with forceps is forced through the placenta.

### **General Remarks on Placenta Previa**

Disinfection of the operator and patient is of fundamental importance.

All examinations and manipulations should be conducted with the patient on her back.

When there has been much loss of blood, narcosis becomes increasingly dangerous. If employed at all, ether should have the preference over chloroform.

If the patient is exsanguinated, and for the moment stops bleeding, the acute anemia should receive attention before proceeding to operate. But should the patient be bleeding when the physician arrives, his first object should be to check the hemorrhage.

One of the early signs of placenta previa is manifested by a brisk discharge of blood upon rising in the morning. If the bleeding continues, and labor has begun, the physician will do well to deal with it after one or the other of the methods described. If, however, bleeding stops upon the patient's going to bed, one may venture to temporize.

Instead of a single severe hemorrhage, there may be a moderate loss of blood continuing over a long period of time, in which case it is permissible to await developments, the patient meanwhile being kept under close observation. The vaginal tampon should not be employed, for, in order to be effective, it must be continuous; and its continuous use would be injurious to the vaginal mucous membrane and would multiply the dangers of infection.

The period immediately following delivery may be accompanied by hemorrhage, no matter how favorably the third stage of labor terminates. Besides, the adventitious location of the placenta inter-

feres with the mechanism of its detachment. One should bear this in mind, and not delay too long the completion of its delivery; otherwise, the loss of blood accompanying it, may, in the presence of an already severe anemia, prove fatal.

Another source of hemorrhage in placenta previa is the cervix itself. Vascularized as it is by placental infiltration, the tissues become friable and easily torn; therefore, much care in the examinations and treatment must be exercised.

### **Premature Separation of the Normally Situated Placenta**

**Symptoms and Diagnosis.**—It occasionally happens that the normally placed placenta becomes prematurely separated from its uterine connection (Fig. 194). This severe complication is equally dangerous to mother and child. Its etiology lies chiefly in the kidney, whose inflammatory condition may be the occasion of decidual degeneration. Violence is another cause of separation, as, for example, a fall on the body or a blow over the abdomen. The resulting hemorrhage is essentially an internal one, since it may be confined between the amnion and the uterine wall. Blood may force its way externally, but the amount that shows is only a small part of what is lost: so that the symptoms of hemorrhage are not in keeping with the amount of blood to be seen: the anemia is increased, the patient is in shock, and the uterus shows a sudden increase in size, tension, and sensitiveness. If the placenta is only partially separated, the consequences are not necessarily fatal to the child; complete detachment of course would be. The situation can be so serious as to look like rupture of the uterus, and is sometimes mistaken for it. There is this difference, however: in one the uterus enlarges rapidly and there is no recession of the advancing part; in the other the uterus becomes rapidly smaller, and there is recession of the advancing part.

**Treatment.**—Inasmuch as it is not possible to reach the bleeding part, the only thing to do is to deliver, after which the uterus itself is capable of arresting the hemorrhage.

If the cervix is sufficiently dilated, delivery may be effected with forceps, or by version and extraction; or, if the child is dead, it may be delivered by perforation and cranioclasia. Unfortunately, however, the complication frequently occurs at the very beginning



of labor, or even before, so that one will not be able to make use of the simpler operations. Under such circumstances the treatment



Fig. 194.—Premature separation of the normally placed placenta. (After Winter.)

must depend on the severity of the clinical picture. If the anemia is slight, the cervix effaced, and only the external os is to be dilated,



all that may be necessary, in order to control the bleeding, will be to rupture the amniotic sac. By doing this the size of the uterus is reduced and sufficient pressure obtained to keep the hemorrhage within safe limitations. One may even take into consideration artificial dilatation; or, a foot may be brought through the cervix, and the child's body itself employed as a dilator. But for the most part, the condition is too severe to warrant much temporizing. In the hospital and under competent hands rapid delivery can be accomplished by vaginal cesarean section, or by divulsion of the cervix with one of the metal dilators, aided perhaps, by multiple incisions after the method of Dührssen. And since the hemorrhage is almost always fatal to the child, its delivery can be expedited by perforation and cranioclasia. Outside the hospital one would hardly dare undertake to do more than turn and extract.

The placenta usually follows at once, accompanied by an accumulation of blood and coagulum. Indeed, the uterus may empty itself so rapidly that its atony, added to the existing anemia, will be too great for the patient to withstand. To meet such emergency, one should be prepared to pack immediately.

An illustrative case of premature separation of the placenta is cited:

Soon after lifting a heavy load, a multiparous woman near the end of pregnancy, experienced great difficulty in breathing; fetal movement ceased; the abdomen became distended. Imagining the bowels and bladder to be responsible for the symptoms, she sought to force an opening, and fainted. Slight bleeding from the vagina appeared.

When brought to the hospital, the following conditions were found: severe anemia; pulse 140 and thready; abdomen much distended, so much so that fetal parts could not be palpated, nor the child's heart heard. There was some bleeding from the birth canal. Cervix shortened, admitting two fingers. Amniotic sac still intact; hydrostatic tension slight. No placental tissue could be felt; head engaged; urine contained albumin.

Diagnosis: premature detachment of a normally located placenta; bleeding in the uterine cavity; dead fetus; severe anemia.

Delivery immediately undertaken. The cervix was dilated with the Leavitt branched dilator, the head perforated, and the child extracted with the cranioclast. After the child had been removed, the uterus still remained large, extending almost to the border of the ribs. Upon exerting pressure on the fundus there came away with the placenta two liters of blood, two-thirds of which was clotted. The uterus remained somewhat atonic, and was at once packed with iodoform gauze. Meanwhile two doses of ergotine were given hypodermically. Also, while these measures were being carried out, treatment

for the anemia was begun. The placenta showed that it had been strongly compressed, and its surface was covered with coagulated blood. The tear in the amnion was almost in the center.

If the periphery of the placenta remains adherent, so that hemorrhage becomes confined to its inner surface, a bulging tumor at this point may be seen externally. Occasionally the hemorrhage will rupture through the border of the placenta and show at the vulva. The report of such a case follows:

Soon after labor began blood appeared externally. At the hospital, where the patient was immediately taken, the following conditions were observed: marked anemia; uterus deflected to the left; large boggy swelling at the side of the fundus. The presentation was left parietal. Heart sounds not heard. Continuous discharge of blood from the genitals. Within the vagina lay a loop of the pulseless umbilical cord and an arm of the child. Nowhere could the margin of the placenta be reached.

Diagnosis: first position of the vertex; prolapse of the arm and cord; child dead; premature detachment of the normally placed placenta.

Delivery was completed by perforation and cranioclasia. Immediately following the birth of the child about 25 ounces of fluid blood came away with the placenta, the placenta itself showing a rupture through a sinus near its border. No untoward morbidity followed.

In rare cases a completely detached placenta may fall in advance of the child, and be born first (prolapse of the placenta). The following is a report of such a case:

The stage of dilatation ran on without any unusual manifestations; especially was there no discharge of blood until the sac ruptured, when half a pint of blood ran off. The obstetric findings were as follows: uterus at the border of the ribs; head in the fundus; absence of fetal heart sounds. From the vulva projected the right foot, near which placental tissue could be seen. After an expulsive pain the entire placenta, which lay in front of the child, was born, the membranes still adherent to the uterus. Fetus hastily extracted, but not alive.

A much more favorable course may be expected when during labor a rapidly diminished volume is the occasion of a partial detachment of the placenta, as, for example, in hydramnion after rupture of the sac, or in twins after the birth of the first child. Usually, the hemorrhage is not great; it shows externally, and is chiefly of danger to the child. Delivery, when possible, should be undertaken immediately.

Premature detachment of the placenta may sometimes be charged

to the cord, which, primarily, may be abnormally short or be made so by twining about the child's body. The delivery of the placenta under these conditions is easily effected. The intact membranes when forced through the vulva also can loosen the placenta. Relief here lies in immediate rupture of the sac.

The outlook in all the hemorrhages of childbirth is not nearly so serious for the mother as for the child, the mortality for the latter being more than fifty per cent.

## CHAPTER XXII

### MULTIPLE BIRTH

Multiple birth, usually in the form of twins, occasionally in triplets, rarely in quadruplets, while not necessarily complicated, always requires increased attention on the part of the physician to see that breech positions, cross-births, and the various deflections of the head do not interfere with labor. Owing to their relatively small size, the fetuses themselves do not add to the mechanical difficulties; they rather decrease them. Nor is premature induction of labor, pubiotomy, or cesarean section, because of pelvic contraction, often necessary. The unfavorable brow position, also, will generally correct itself spontaneously; and even prolapse of the cord will terminate favorably. There are, however, certain conditions in every phase of a multiple birth that call for special treatment.

### TWINS

**The First Twin.**—Labor in the case of twins is ushered in with distinctly impaired forces. The abnormal stretching of the uterus often leads to a state of innervation that makes artificial aid necessary. In this respect the condition is not unlike that of hydramnion. When the amount of amniotic fluid is greatly increased, as it oftentimes is, it may be necessary to rupture the sac before the uterus can effectually contract. It should be borne in mind, though, that decomposition of the retained fluid with fever of the mother and asphyxiation of the child may result if rupture is not soon followed by delivery. For this reason it may be advisable not to wait for its spontaneous birth, but to deliver the child instrumentally or otherwise at once. In about twenty-eight per cent of twin pregnancies this will be found expedient. Still one must not be too hasty, for even here spontaneous birth offers the best surety against complications.

**The Interval.**—Following the birth of the first twin, and before the second is delivered, several things may happen that require consideration. First, the marked decrease in size of the uterus sometimes causes a partial separation of the placenta, which may result in asphyxiation of the second twin. It is essential, therefore, that the fetal heart be listened to at frequent intervals during this interim, and preparations made to deliver quickly should the heart appear to be failing. Second, the possibility of the remaining twin bleeding to death through the placenta and cord of the first should not be forgotten. To prevent such an unfortunate occurrence the funis of the one born first should be securely clamped or tied while awaiting the birth of the other. Particularly is such precaution necessary in the case of unioval twins.

The period of inactivity following the birth of the first twin may be utilized in making an exact diagnosis of the position of the child still to be born. This can be done generally by external palpation alone, but when in doubt one ought not to hesitate to make an internal examination, as well. Even then mistakes not infrequently happen, as may be seen in the following instances:

A case was diagnosed as one of twins. After turning and extracting the first child, which lay in a cross position, the attending physician went directly with the hand into the uterus to deliver the other twin without making an external examination. The cavity was found to be empty; and what he took to be a second fetus proved to be a bicornate uterus.

A young doctor brought a woman said to be pregnant with twins to the hospital. The first child, which presented by the breech, was delivered. He then made a surface examination, and, being convinced that the remaining child occupied a transverse position, sought to convert it by external manipulations into a head presentation. His efforts failing, he called in consultation a more experienced obstetrician, who found, in place of a head, a large submucous myoma.

A careful examination, one which combined both internal and external palpation, would greatly have aided the diagnosis in either of these cases.

**The Second Twin.**—As a rule the second child follows the first within a period of from thirty to sixty minutes; but the interval may, if allowed to pursue its own course, be prolonged for several hours or days or even weeks. Such a course would not be desirable. In the first place the delay demands the presence of the accoucheur or a skilled assistant during the entire time; and, in the

second place, it invites contamination, since the passage of the first child is sure to leave in its wake numerous lesions that are particularly susceptible to infection. A too rapid emptying of the uterus, on the other hand, is also dangerous inasmuch as serious hemorrhage sometimes accompanies the atony which follows when the overdistended uterus is speedily evacuated. A safe rule to follow in the absence of indications demanding interference earlier, is to rupture the sac at the end of two hours and give a dose of pituitary extract. Those of much experience may venture to cut the time of waiting down to an hour or even thirty minutes. Instead of the pituitary extract, ergot may be given with much the same effect.

It is quite common for the second child to assume a transverse position, which easily may be converted externally into a longitudinal one if done before the sac ruptures. If, however, the sac has already ruptured, and the amniotic fluid has drained off, the tendency is for the fetus to become immobilized.

Interference of some sort in the birth of the second twin becomes necessary in about fifty per cent of the cases, the most frequent operation being that of version and extraction.

**The Placental Period.**—The birth of twins is frequently followed by a state of atony. This is due in part to the lack of muscle tone, noticeable throughout labor, and in part to the sudden relief of pressure in the overstretched uterus. The increased size and abnormal form of the placenta has doubtless some influence, too. In a relatively large number of cases manual separation of the placenta will be necessary, so that one should always be prepared with ergot, apparatus for giving infusions, disinfecting solutions, sterile gloves, and restoratives. Even after the placenta has been expelled, there may be need for these things because of the atony that sometimes follows. The uterus should be watched for an hour or more to see that it remains firmly contracted.

### RARE COMPLICATIONS

Peculiar complications arise when both amniotic sacs rupture before the birth of the first child. The most remarkable twisting and interlocking of the fetuses can then occur. For example, the prolapse of an extremity or cord of one child may so fix itself about

the other as to make delivery exceedingly difficult, or, possibly, cause fetal death. Under these circumstances effort should be made to save only the living child. If both lie in the head position, the head of the second fetus may sink into the pelvis before that of the first is fully born. Delivery by forceps of the most dependent head would then be necessary. Should the head of the second



Fig. 195.—Interlocking heads in the birth of twins. In the birth of the first twin, which is coming breech first, the head has become arrested by the head of the other twin.

child come down into the pelvis after the head of the first has been born, it may be necessary to extract the second one before the delivery of the first can be completed. Even perforation and cranioclasia may have to be resorted to.

In dealing with the breech position of the first child, the head of the second descending before the first is born, the one presenting

by the breech must give way to the other; otherwise there would occur a serious interlocking as the head of the first child attempted to pass the head of the second (Fig. 195). Again, if the head of the second child comes down into the pelvis when the first is nearly born it may be possible to push the second head back far enough to allow the complete birth of the first child. If both children lie interlocked in the breech position, the lower one should be extracted first. In the rare situation of one child lying so that its head becomes locked in the neck of the other, as may happen when one fetus lies in a cross position and the other presents by the breech, a dismembering operation generally becomes necessary, though some attempt to push the one lying transversely up out of the way should first be made.

#### **Further Observations Concerning Twins**

In the birth of twins the frequency of the breech presentation, as compared with head presentations, is as one to two. This is true of both twins. The proportion of transverse positions, comparing the first twin with the second, is as one to four.

Another thing to be noticed in the birth of twins is, that assistance more frequently becomes necessary in the delivery of the second child than of the first. And while forceps is employed three or four times oftener in delivering the first twin than version, version is performed ten times oftener in delivering the second twin than it is delivering the first.

The mortality in twin pregnancy is practically nothing for the mother; but for the children it reaches eighteen per cent. So high a rate for them is due, not so much to the difficulties of birth itself, as to the disturbed intrauterine relation, which may cause one or both to perish before they are born.



## CHAPTER XXIII

### THE TRANSVERSE POSITION

The transverse position almost always calls for help. In rare instances and under peculiar circumstances the child may be born without assistance; but this is only possible when the position of the child changes to a longitudinal one spontaneously, or the child is forced through the birth canal in a greatly distorted form. The evolution of a cross-birth into a longitudinal one can come about only when the head or the breech at the beginning of labor lies near the pelvic inlet. Its conversion into one or the other of these positions is favored still further by the posture of the mother. Termination of labor with the child still lying transversely but in a distorted attitude can occur through the advancing shoulder being driven under the symphysis, the body of the child following in its long axis,—first the breast, then the abdomen and buttocks, and finally the lower extremities (Figs. 196 and 197). Usually the last part to be born is the head, but instead of it coming last, the child may sometimes be so strongly folded upon itself (Fig. 198) that the head lies in advance of the buttocks, and, in this attitude, the shoulder passes under the symphysis first, followed by the head and then the buttocks. It would, however, be impossible for a child to be born in either of these attitudes unless the explosive forces were strong, the pelvis wide, and the fetus compressible; and it could hardly occur at all except in very small children (twins), premature births, and macerated fetuses.

### TREATMENT

The most favorable turn for a cross-birth to take is for the head to fall into presentation. If this does not occur spontaneously, external version may be made. But there are certain conditions which make it inadvisable always to do this. For example, if the breech occupies a position nearer than the head to the pelvic inlet, it

would be better to favor the evolution of that pole instead. Or, if some of the essential preliminary conditions are wanting to make external version by the head fairly easy of accomplishment, version by the foot would be indicated, and extraction possible.

There is, then, in cross-births an opportune moment when version should be undertaken, or not undertaken at all. Neglected beyond this point, the forces of labor soon immobilize the child so completely that nothing remains to be done but to remove it by embryotomy. The shoulder is driven into the excavation, the lower segment of the uterus retracts, the ring of Baudl, with its vise-



Fig. 19c. Spontaneous evolution. (Bumm.)

like constriction, closes in upon the fetus, and the child finally becomes asphyxiated. If, perchance, it is still living, an effort should be made under deep anesthesia to release it. The attempt, however, must be carefully conducted, and not persisted in for more than a few minutes. If the child is dead, even a trial version is not advisable, but embryotomy should be performed instead.

So long as the amnion remains unruptured, neither the mother nor the fetus is in any immediate danger; but, if the sac has ruptured and the amniotic fluid drained away, the uterus soon contracts about the fetus so tightly that manipulations become exceedingly difficult, even dangerous, although the danger is not



Fig. 197.—Spontaneous evolution. (Bumm.)



Fig. 198.—Partus conduplicato corpore. (Zangemeister.)



Fig. 199. --Spontaneous evolution in a cross-birth. Reported by Dr. H. A. Stephenson.  
The impaction of the shoulder.

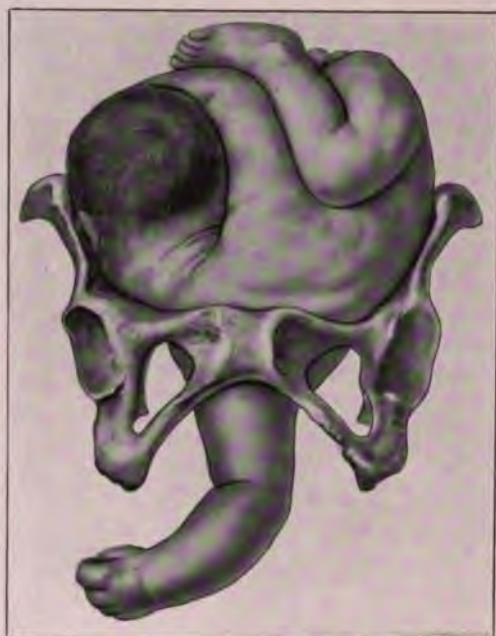


Fig. 200.—The arm prolapsed.



Fig. 201.—The occiput has rotated almost directly anterior and lies just above the pubis; the neck much elongated; left shoulder emerging from beneath the pubic arch.

great as to prevent one from making some effort to save the child's life.

Finding the cervix still short of complete dilatation, the sac intact or but recently ruptured, a hydrostatic bag will be of service. Besides aiding dilatation, it acts as an efficient plug, preventing the sac from sagging and the shoulder from sinking into the pelvis. A prolapsed arm or loop of cord should, of course, first be replaced before attempting to introduce the metreurynter.



Fig. 202.-The child has undergone a movement of rotation, the prolapsed arm returned to the side of the mother toward which it was originally directed, thus bringing the occiput under the pubic arch in the most favorable position for easy expulsion.

In considering the best interests of the child, one awaits complete dilatation of the cervix before undertaking version and extraction: otherwise the larger end of the fetal wedge, which comes last, will be delayed at a time when delay is dangerous. If it can be established that the child is no longer alive, version may be done early and labor allowed to go on naturally.

The prolapse of a foot or an arm or of the umbilical cord is of common occurrence in transverse positions. Prolapse of the foot

is accounted to be favorable, since labor may go on to a spontaneous termination; and, if it does not, the member furnishes a convenient handle on which to make traction. No effort should be made to replace a prolapsed arm. The attempt would be futile, anyway, and would multiply the dangers of infection. Later, it furnishes something to pull on when trying to bring the fetus within range of the decapitation hook, should its use be found necessary. It is also true of the cord, when it falls down, that no effort to return it should be made; the shoulder so completely fills the encircling girdle of the canal that it could not be done.

## CHAPTER XXIV

### DEFLECTIONS OF THE HEAD

#### **THE OCCIPITOPOSTERIOR POSITION**

The occipitoposterior position is one in which the head of the child lies with the smaller or posterior fontanel in the hollow of the sacrum, the large or anterior fontanel lying under the symphysis pubis. The glabella meets with the arch in front, beneath which it slides; the occiput passes along the floor of the pelvis, and escapes over the perineum. A child in this position is often born spontaneously, but the process is usually a long and tedious one. The functionating diameter of the head is increased over what it is in the more favorable anterior position; and, besides, the head can not adapt itself so readily to the birth canal. It, therefore, becomes desirable to convert it into a more favorable position. If this can not be done, the case must be managed in some other way.

There are two measures which favor the rotation of the head from a posterior to an anterior position of the vertex; namely, keeping the patient on the side toward which the small fontanel is turned, and the maintenance of flexion of the child's head. Thus will the occiput, the part first to meet with resistance, tend to rotate anteriorly. Failing to take this more favorable turn, and persisting in the posterior position, it is recommended as a prophylactic measure that a vaginoperineal section be made. The technic of forceps delivery in this position is described on page 190. If the fetus is dead, delivery with the cranioclast should be undertaken without further delay. The operation saves the mother's tissues as well as her strength, and is always justifiable under such circumstances; but there should be no mistaking a living for a dead child.

Treated expectantly, more than eighty per cent of the occipitoposterior positions will terminate spontaneously; the remaining twenty per cent require the aid of forceps. As for life, the mother



is never in any particular danger. The risks for the child, however, are considerably increased; and whether spontaneously born or delivered with forceps, the fetal mortality is about the same, namely, fifteen per cent.

### PRESENTATIONS BY THE FACE

A face presentation will in most instances terminate spontaneously. The tendency is for the bulky occiput to find its way into the hollow of the sacrum, the chin turning to the front. In this position flexion begins as soon as the chin passes under the symphysis, following which the brow, vertex, and occiput rotate in succession over the perineum. Owing to the irregular contour of the face, the membranes are subjected to an unequal pressure that favors their early rupture. For the same reason the cord or a fetal member is permitted to slip by.

An exceedingly unfortunate evolution in face presentations is for the chin to rotate posteriorly into the hollow of the sacrum, the forehead coming against the symphysis in front. Birth in this position is practically impossible. If the head is freely movable above the pelvic inlet, one may attempt to change the face presentation position into an anterior position of the occiput by flexing the chin forward (the Thorn manipulation, Fig. 43), or perform version and extraction. If neither of these procedures is judged to be safe, because of the danger of rupturing the uterus, the operator may, even in a living child, be forced to perforate through the orbit and deliver with the cranioclast. Such a procedure, however, is to be countenanced only when the facilities for performing cesarean section are inadequate.

If the head remains above the inlet with the cervix fully dilated, an arm or the cord fallen down, version and extraction are indicated. If the cervix is not fully dilated and the prolapsed cord is pulsating, it may be worth while trying to reduce the dislocation pending further developments.

If the head has descended, but remains fixed, we have a valuable ally in the forceps. With the face lying anteroposteriorly, the blades are applied to the sides of the head, their coaptation in this position being exceptionally favorable. If the face presents ob-

liquely, the application of forceps should be made in the oblique diameter of the pelvis. The adjustment of the instrument in this position is, however, more difficult and its hold less secure.

### **PRESENTATION BY THE BROW**

As in face presentations, a brow presentation will occasionally terminate spontaneously; but usually it demands obstetric interference, especially if the mother's pelvis and the child's head are of normal proportions.

If the head has become arrested in descent the use of forceps is indicated; if it still lies above the inlet, an attempt should be made to convert the presentation into another and more favorable one, such as a vertex, footling, or, perhaps, a face. Since the most frequent position of the brow is one with the occiput lying posteriorly, it is out of this position that an occipitoposterior position of the vertex may be secured. (See Thorn's method, page 108.) In some instances it may be easier and more desirable to extend the head instead of flexing it, thus making a face presentation with the chin under the symphysis.

If the head already has become arrested, a competent surgeon would probably undertake cesarean section; one less experienced would prefer to deliver with forceps. Even then instrumental delivery should not be attempted unless it is well established from bimanual examination that the head is well down in the pelvis. Spontaneous birth is only possible when the child is small, the birth premature, or the fetus macerated.

## CHAPTER XXV

### PROLAPSE OF THE UMBILICAL CORD

In considering the subject of cord displacement, a distinction is made between *forclying* and *prolapse*, quite different causes being ascribed to each. The one is a primary, the other a secondary, condition. Forelying, or *presentation* of the cord, as some prefer to call it, is the result of either an abnormally long cord, a velamentous or marginal insertion, or a very low situation of the placenta. Every case of presentation becomes one of prolapse as soon as the membranes rupture; but it does not follow that every case of prolapse is first one of presentation. (Fig. 203.)

Prolapse is the result of a combination of two conditions, maladaptation and hydrostatics; the presenting part of the fetus does not fit the bony girdle of the pelvis, so that, when the amnion gives way, the dependent funis is carried outward by the gush of escaping water.

While displacement of the umbilical cord is profoundly serious, so far as the child is concerned, it is accompanied by little danger to the mother. Aside from the casualties incident to rapid delivery, and the manipulations of replacement, dilatation, etc., there are no serious consequences.

Inasmuch as the gravity of a prolapse depends largely on the position of the fetus at time of birth, it will be well to study the subject from this point of view.

**Prolapse in Transverse Positions of the Fetus.**—The defective closure of the pelvic girdle, so characteristic of the transverse position, greatly favors funic displacement; and, while prolapse occurs most frequently in this position, it is the most amenable to treatment. So long as the sac remains intact there is little danger from pressure, and the condition requires no particular treatment other than is recommended in any case of cross-birth,—that is, to prevent, if possible, the premature rupture of the amnion until the cervix becomes dilated. The patient is directed to remain

in bed, and to refrain as much as she can from conscious efforts to deliver herself. A valuable device for holding back the forelying cord is the colpeurynter. If this instrument is not at hand, the vaginal tampon may be similarly employed.

If cephalic version is performed (by external manipulation, of course), special precautions should be taken afterward to make sure that the cord does not lie in front of the advancing head before rupturing the sac.

In dealing with prolapse after the amnion has ruptured, much

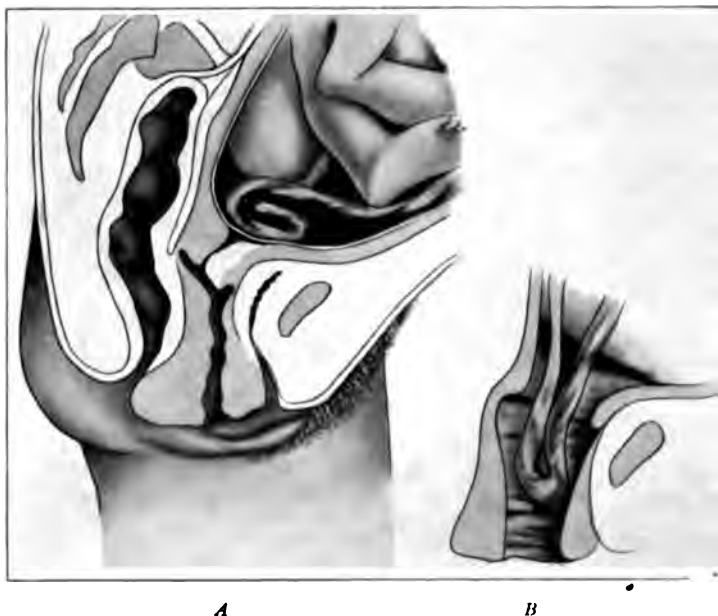


Fig. 203. *A*, presentation, or forelying, of the umbilical cord, the membranes unruptured.  
*B*, Prolapse of the cord, the membranes ruptured.

depends on the patency of the cervix. As far as pressure on the cord is concerned, the greater the dilatation the more is the danger, since all parts, funic, as well as fetal, move deeper into the pelvis. An open state of the cervix, on the other hand, facilitates delivery. In one instance it may be sufficient to observe the process of birth closely and wait; in another, particularly if with the cord an arm has fallen down, pressure effects may make it necessary to replace the dislocated members and keep them out of the

way of harm until the uterus has opened sufficiently to admit of delivery.

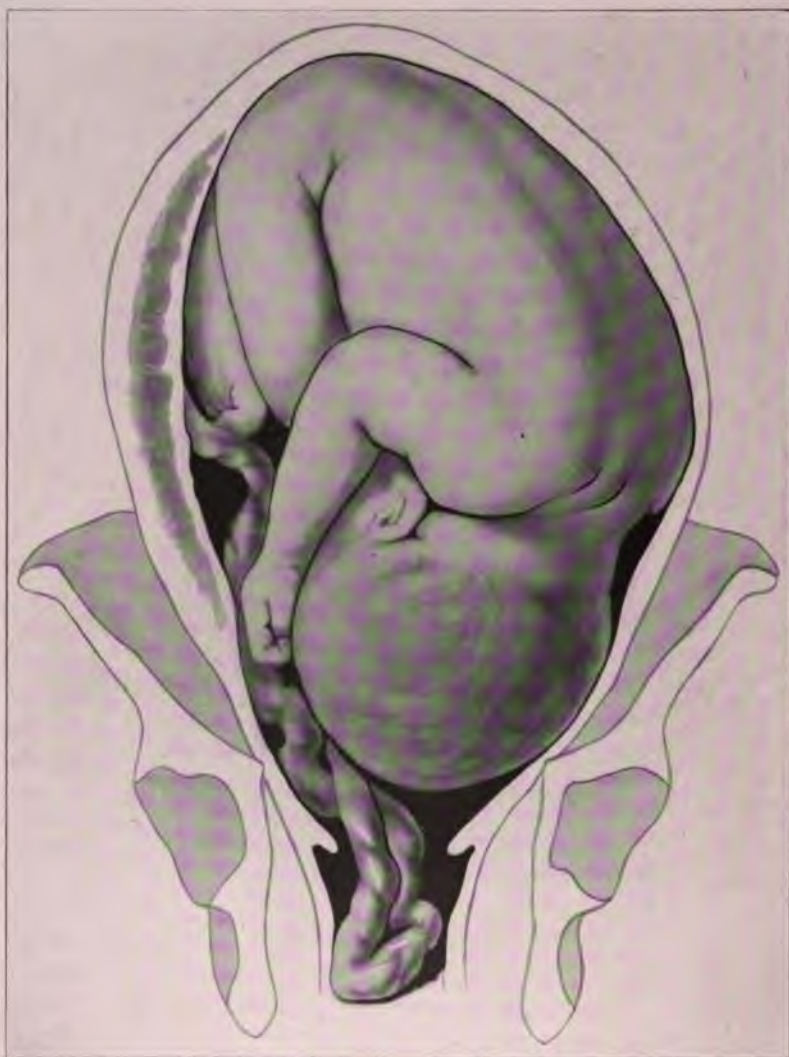


Fig. 204.—Prolapse of the cord. (Bumm.)

**Prolapse in Breech Presentation.**—The pressure exerted on the cord by the soft and not very voluminous breech is comparatively

slight, especially if the amniotic sac is intact. By means of postural treatment, such as the exaggerated Sims, the modified Trendelenburg, or the knee-chest position, the cord will sometimes fall out of the way until the breech completely fills the pelvic girdle. If the sac has ruptured and the cord fallen, but the cervix as yet not fully dilated, the prolapsed member, after being replaced, can be kept from coming down again by making traction on the foot. It is not always possible, however, to get the foot, but, when it is,



Fig. 205.—Instrumental reposition of the cord by means of a threaded catheter. (After Edgar.)

a more favorable position for the cord may be maintained by it; and, besides, one stands in a better position to do an extraction should the exigencies of the case demand it. When first seen, labor may have reached a stage where the breech lies low in the pelvis, with the cord prolapsed and the cervix only partly dilated. In this case the thing to do, provided the cord is still pulsating, is to incise the cervix and extract the child.

**Prolapse in Foot Presentation.**—A footling, complicated with

prolapse of the cord, is even less menacing than either of the foregoing. No special treatment is indicated unless pressure manifests itself, when, upon the descent of the buttocks, extraction can readily be executed.

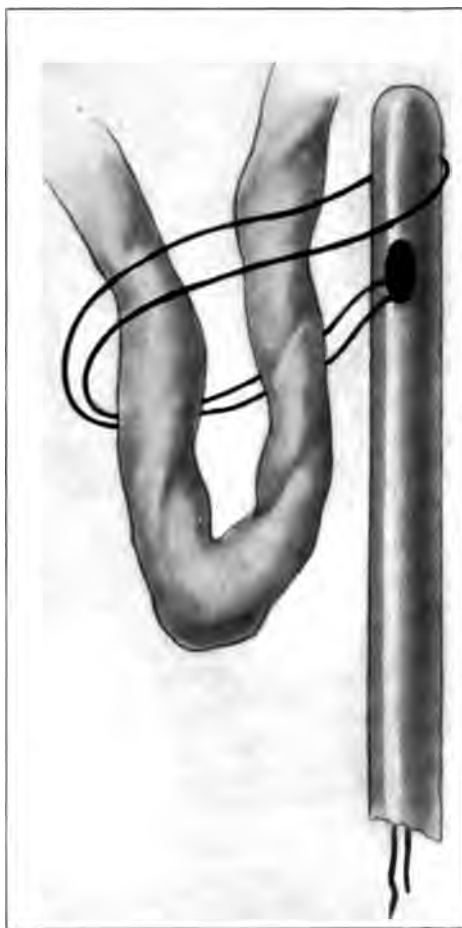


Fig. 206.—De ail of threaded catheter with a loop of thread entwined about the cord.

**Prolapse in Head Presentations.**—While it is true that more than one-half of all the cases of prolapse occur in vertex births (Fig. 204), the ratio is small as compared with that of presentation by the shoulder and breech. Take them as they run, prolapse oc-

curs about once in 154 births. Five of these would present by the breech, and only one by the shoulder, yet 25.2 per cent of all cases of prolapse are associated with the breech, and 17 per cent with the shoulder. The head, because of its shape, size, and consistence, does not favor displacement of the funis, but the danger from pressure becomes greatly increased in case it should prolapse. If the cervix is fully dilated when the displaced cord is discovered, nine-tenths of the danger is over, provided, of course, that the cord has not already suffered from pressure. But, on the other hand, if when the cord comes down, the effacement is only partial, the outlook for the child is bad, no matter what facilities are at hand.

In any case some attempt should be made, first of all, to relieve the pressure, and to ascertain if the child be alive; for obviously, it would be useless to start procedures of delivery if it be dead. With the patient in the knee-chest posture, it may be possible to replace (Fig. 205) the cord, but should an anesthetic be required, the Trendelenburg position is better. One must not forget when palpating the cord that its pulsations may be lost during a contraction only to return when the pain has passed. If the fetus, unmistakably, is dead, all therapeutic measures, as far as the child is concerned, are abandoned: if alive, the treatment to be followed will depend on the conditions that accompany the prolapse.

### TREATMENT

Before undertaking any procedure of relief, there are a number of things one would wish to know. For example, is it the patient's first or subsequent labor? Will the cervix yield readily to artificial dilatation? Has the sac ruptured, and, if so, for how long? What are the facilities at hand for replacing the cord?

Generally speaking, the management of prolapse is more difficult in the primipara than it is in the multipara: the parts are more contracted, the tissues offer greater resistance, and the patient herself is less responsive to the obstetric measures instituted. But more depends on the condition of the cervix than on any one other thing. If it is undilated and undilatable, prolapse of the cord presents a very difficult problem indeed.



In case the sac has ruptured and the cord fallen outside the vulva, it should be protected from pressure and be kept warm. The patient should remain quiet in bed, otherwise her movements will not only disturb the means of protection, but will also subject the cord to greater danger from pressure. If the cord continues to fall in front of the advancing part, it may be possible to hold the head at the time of a contraction until the cervix dilates and delivery becomes possible. If the head wholly or in large part has already entered the pelvis, the external os alone remaining to be dilated, one may incise the resisting margin and deliver the child with forceps. Again, if the cervix remains closed and the physician can promise with considerable degree of certainty that the result will be successful for both mother and child, he may be warranted in performing cesarean section, either abdominal or vaginal.

With the head still above the inlet of the pelvis (the most frequent situation in prolapse) the best treatment, undoubtedly, is podalic version and extraction. The only rival procedure would be cesarean section, and this only when the life of the child is reckoned equal to, or more important than that of the mother. If the head has already entered the pelvis, delivery may be effected with forceps, great care being taken not to include the cord in its grasp.

In prolapse of the cord there is a variation from the usual method of performing version which is worth remembering, and that is to turn the fetus in the direction opposite to that in which it ordinarily would be turned. If version is made by the shorter route, the umbilicus is brought nearer the pelvic brim than it was before, thus favoring the further descent of the cord. So, instead of pushing the head in the direction of the fetal back, as is usually done, it should be pushed toward the chest. The umbilicus will in this way be carried away from the pelvic brim. As the leg is brought down the prolapsed cord should be placed in the posterior angle of the oblique diameter opposite to that in which the back of the fetus lies; and, so long as there is pulsation, further interference is not necessary. But in case the pulsation stops, extraction by the foot will have to be made if any hope is entertained of getting a live child. It may be added, however, that, in any event, the prognosis is bad.

It is always desirable to have the patient lying instead of

standing when the sac ruptures. Only when the advancing part completely fills the pelvic girdle should a woman in labor be allowed to assume the upright position. Especially should this rule be observed if the stage of dilatation is well advanced for, with the announcement that the waters have broken, the patient may add that something is felt protruding from the vagina. Besides, standing favors the accumulation of the forewaters, which in themselves lead to the early rupture of the sac.

Should it become necessary to rupture the amnion when in the multipara the head will not engage, it should be done with the greatest precaution, bearing in mind the possibility of a loop of cord lying low in the cavity. Instead of making a large opening and allowing the water to rush out with force, a small one should be made, and the fluid drained off slowly. With one hand applied to the mouth of the uterus, the other making counterpressure on the fetus externally, the amount can be regulated and the cord kept from slipping past the head. The same precautions should be observed in the use of the metreurynter. As it is brought away, the presenting part should follow closely.

## CHAPTER XXVI

### THE CONTRACTED PELVIS

In the language of De Lee, "No subject in medicine presents greater difficulties in all its aspects; and none demands so much art and practical skill as does the management of labor in conditions of pelvic contraction." And, it may be added, there is no knowledge of the subject so essential as a good understanding of the mechanical principles involved. If the time should ever come when babies generally, instead of making their advent *per vias naturales*, are lifted through an abdominal incision, little thought will then need to be given to the difficult problems of pelvic deformities. That time, however, has not yet arrived, and students of obstetrics will need to go on familiarizing themselves with things as they are.

### CLASSIFICATION

The following classification of contracted pelves (Fig. 207) is simple and practical:

**THE SIMPLE FLAT PELVIS.**—This form differs very little from the normal, except that the anteroposterior diameter is foreshortened.

**THE RACHITIC FLAT PELVIS.**—The peculiarity of this form is, that the sacrum is not only pushed forward, but is rotated on its transverse axis.

**THE GENERALLY CONTRACTED PELVIS.**—This is commonly known as the *justo minor pelvis*. Strictly speaking, it is not a deformed pelvis. While it may sometimes be slightly asymmetrical, it is essentially a normal pelvis in miniature.

**THE PELVIS CONTRACTED AT THE OUTLET.**—This is the so-called funnel-shaped pelvis, said to be a common form among the white women of America.

**OBLIQUE DEFORMITIES OF THE PELVIS.**—Such distortions come from some childhood affection of the knee, hip, pelvis, or spine.

**THE COXAIGIC PELVIS.**—Probably the most common of the oblique contractions. It is due to unequal femoral pressure. The well side is the one to become distorted.

**TRANSVERSE CONTRACTION.**—Not common.

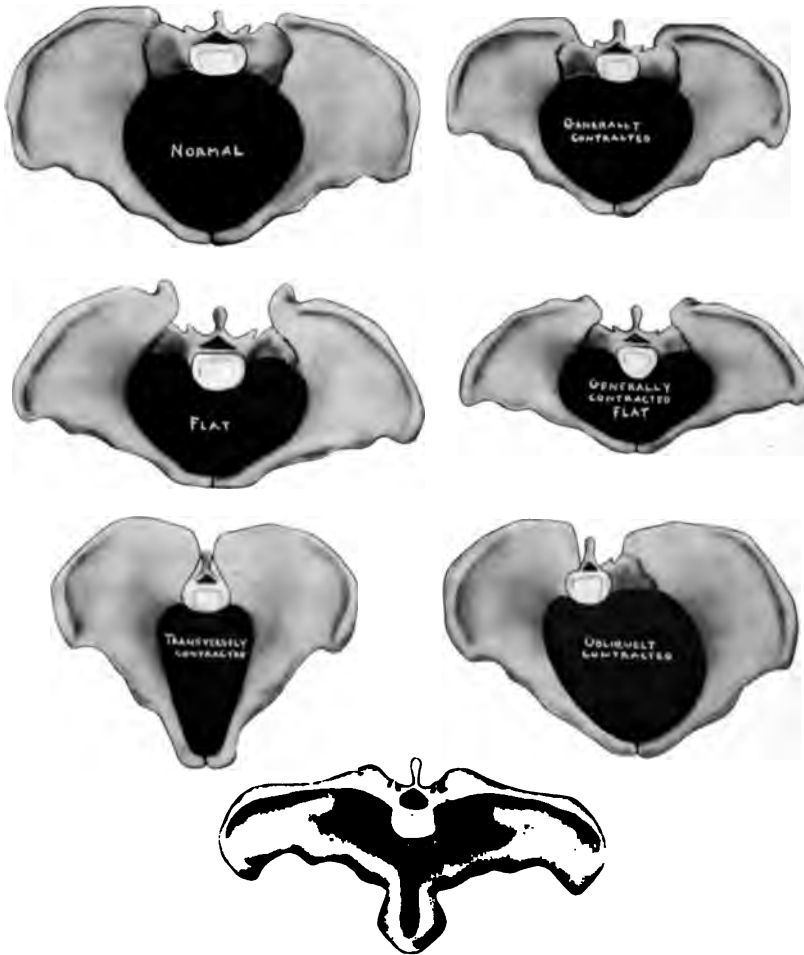


Fig. 207. —The more common types of pelvic deformity compared with the normal.

**THE ROBERT'S PELVIS.**—A very rare form of transversely contracted pelvis; only ten cases recorded.

**THE KYPHOTIC PELVIS.**—Peculiar to the humpback.

SPONDYLOLISTHETIC PELVIS.—An exaggerated lordosis of the lumbar spine. (Fig. 208.)

OSTEOMALACIC PELVIS.—Unknown in America, England, and France.

JUSTO MAJOR PELVIS.—Not a deformity, simply a very large pelvis.

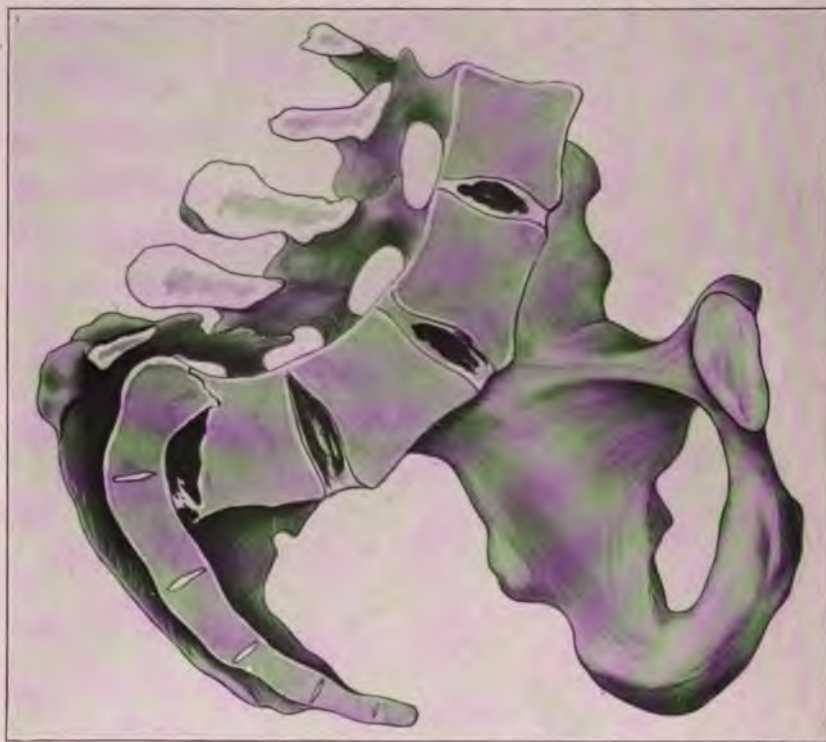


Fig. 208.—The spondylolisthetic pelvis. (After Bumm.)

Schroeder divides pelvic contraction into three groups, *absolute*, *relative*, and *moderate*. If the true conjugate is below 6.5 cm., birth by way of the natural passages is impossible; the child must be delivered through the abdomen. If the same diameter is above 6.5 cm. and below 9 cm. a living child can sometimes be born naturally, a mutilated one always. A third degree includes pelvises with true conjugates of from 9 cm. up to normal. These measurements

apply only to the flat pelves. In the generally contracted pelvis, 0.5 cm. should be added to the upper limit of each division.

### **The Rhomboid of Michaelis**

When this rhomboid figure of the lumbosacral region is of average size and form, the pelvic opening is also said to be of average size



Fig. 209. Ideal female figure showing the rhomboid of Michaelis.

and form. Its variation is a registration, more or less accurate, of the altered shape of the inlet. If, for example, the lateral depressions are widely separated, the sacrum is broad and the pelvic opening large; if close together, the converse is true. The upper point sometimes lies low, approaching the level of the lateral arms of the figure. This would indicate a pushing forward and downward of the sacrum, as would occur in a rachitic flat pelvis and in

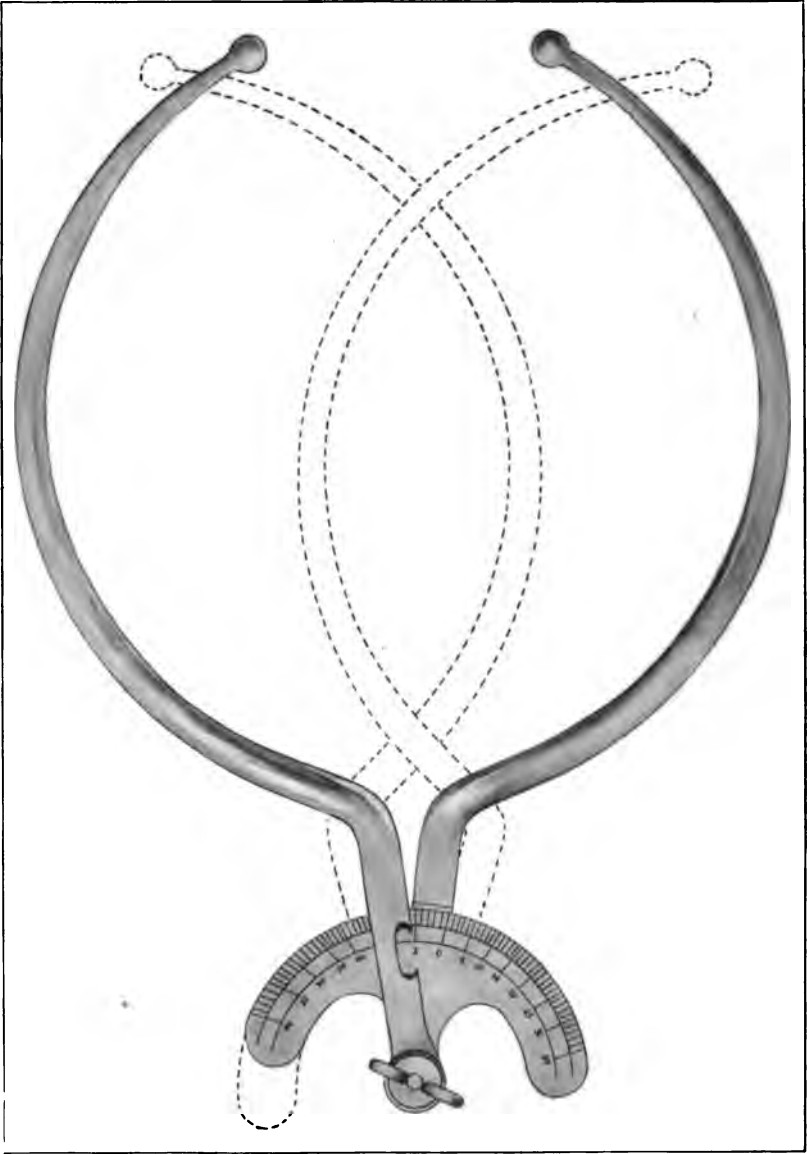


Fig. 210.—Breisky's pelvimeter.

certain cases of spinal curvature. Again, when the figure becomes distorted, one arm of the rhomboid lying lower than the other and nearer to the median line, it is probable that the pelvis is of the obliquely contracted type.

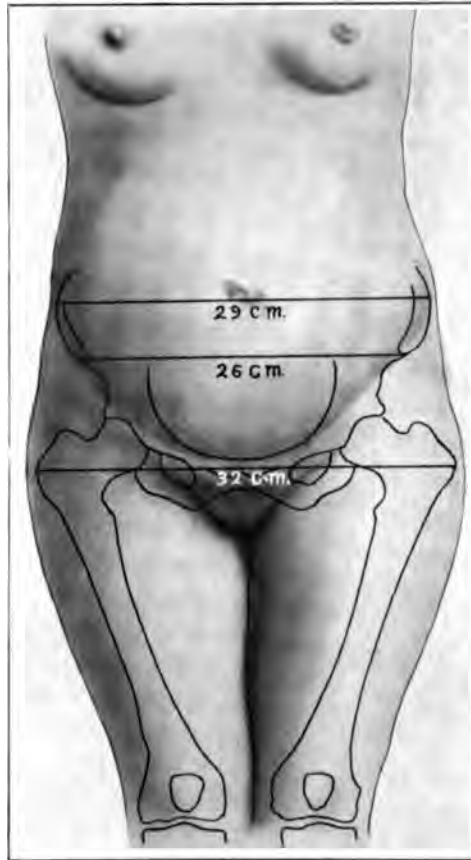


Fig. 211.—Female figure with pelvis and lines of measurement outlined. (Bumm.)

### Pelvimetry

There are many instruments and devices for measuring the pelvis, some of which are complicated, impracticable, and expensive. For internal measurements, the hand is the best pelvimeter. But



hands vary ; and, until the size of one's hand becomes thoroughly known, accuracy and uniformity must be acquired by means of instruments of precision.

There are not many measurements at most, and but few that



Fig. 212.—Taking the interspinal and intercrystal measurements.

need be taken. The external ones are (1) the interspinal, (2) the intercrystal, (3) the intertrochanteric, (4) the external conjugate, (5) the right and left oblique, and (6) the intertuberal. These are all taken with the Breisky pelvimeter (Fig. 210).

**External Measurements**

(1) **THE INTERSPINAL DIAMETER (26 cm.).**—This is the distance from the anterosuperior spine of the ilium on one side to a corresponding point on the other (Fig. 212).

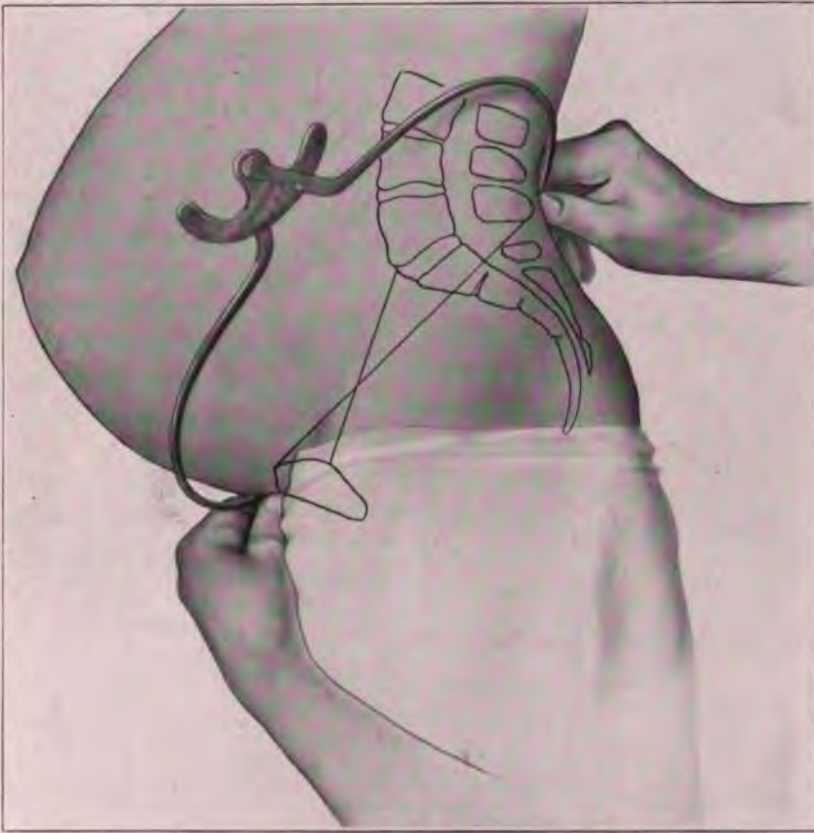


Fig. 213.—Measuring the external conjugate.

(2) **THE INTERCRISTAL DIAMETER (29 cm.).**—This is the distance between the crests of the ilia (Fig. 212).

(3) **THE INTERTROCHANTERIC DIAMETER (32 cm.).**—This is the distance between the right and left trochanters.

(4) **THE EXTERNAL CONJUGATE DIAMETER (21 cm.).**—This is of-

ten referred to as the diameter of Baudelocque, and represents the distance between the upper external border of the sacrum and the upper external border of the symphysis pubis (Fig. 213).



Fig. 214.—Measuring the intertuberal diameter of the outlet.

(5) THE RIGHT AND LEFT OBLIQUE DIAMETERS (22 CM.).—This measurement is taken from the posteriorsuperior spine of the ilium on one side to the anteriorsuperior spine of the other.

(6) THE INTERTUBERAL DIAMETER (11 cm.).—This is the transverse diameter between the tuberosities of the ischii (Fig. 214).

(7) THE ANTEROPOSTERIOR DIAMETER OF THE OUTLET.—This is the distance between the middle of the pubic arch in front to the tip of the coccyx behind, and measures about 12.5 cm. Two other measurements of the outlet are sometimes referred to, namely, the



Fig. 215.—Measuring the anteroposterior diameter of the outlet.

anterior and the posterior sagittal. They are calculated from an imaginary point where the anteroposterior diameter of the outlet bisects the intertuberal, the distance from this point to the lower border of the symphysis pubis in front being the anterior sagittal diameter, and the distance from the same point to the tip of the coccyx in the back, the posterior sagittal diameter. (Fig. 215.)



### Internal Measurements

Several instruments designed to measure the true conjugate have been devised (Fig. 216). In order to use them with safety and accuracy the finger must direct their introduction and adjustment to the points between which measurements are to be taken; the promontory must be located before the internal end of the pelvimeter can properly be placed. The query presents itself, Why not measure with the hand in the first place? In fact the hand is used much oftener for purposes of pelvic mensuration than any of the mechanical devices. Fig. 217 shows the hand in position for measuring the obstetric conjugate. The distance between the point where the upper surface of the examining hand rests against the lower border of the symphysis, and the point on the promontory of the sacrum touched with the tip of the second finger of the same hand, represent the diagonal conjugate. The true conjugate is approximately one and one-half centimeters less than this.

In measuring the diameters of the outlet the hand again becomes useful. In its application here, it is the closed fist instead of the extended fingers, that is used to measure with. The Breisky pelvimeter, however, is more scientific and is exceedingly simple of adjustment. Even a tape measure or a piece of string answers the purpose.



Fig. 216.—Faust's pelvimeter for the direct measurement of the internal conjugate diameter.

### Treatment

The indicated treatment in the more marked contractions of the pelvis is definite. That is, the pelvis is so obviously contracted that birth can not take place through the natural passages, and but one thing is left to do, and that is to deliver by the abdominal route. In this category belong pelvises with a true conjugate of 5.5 cm. or under. Through an opening as small as this even the dismembered child can not be delivered;

nor is it possible in a pelvis with the above dimensions to deliver prematurely with any hope of getting a viable child, because labor would need to be brought on too early to make extrauterine existence of the fetus possible. The delivery, then, of all cases in this class, whether the child is alive or dead, would have to be by cesarean section.

In another class of cases, where the pelvic contraction amounts to

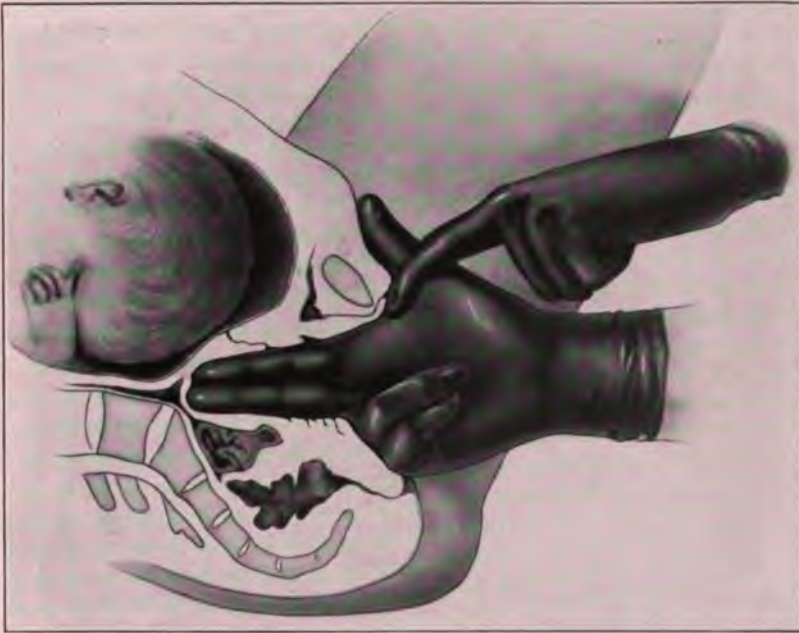


Fig. 217.—Manual measurement of the internal conjugate.

7 cm., a living full-time child can not be born by the vagina; but it may, however, be delivered by embryotomy. Even then it becomes difficult. A premature child, if small enough, might pass after one of the operations designed to widen the pelvis, such as symphyseotomy and pubiotomy, had been performed.

To know what to do in the first class of cases is, as has been remarked, easy; but in the other group with the true conjugate measuring 7 cm. the problem becomes extremely puzzling. If the patient is in the hospital, or can safely be taken there at the

ginning of labor and before any examinations or attempts to deliver have been made, the child living and at term, **cesarean section** is indicated. Under the same circumstances, except that the **child** is dead, perforation and cranioclasia is the operation to be performed. If the child is living and viable, but short of term, induction of labor and pubiotomy are to be considered.



Fig. 218. Chondrodystrophic dwarf. (Ribemont Dessaignes.)

A contracted pelvis with a true conjugate above 7 cm. is the one that perplexes the obstetrician most. Because of its frequent occurrence in practice, and the fact that a spontaneous birth of a living child is not impossible, one is often halted between two opinions,—whether to let alone or to interfere. Primarily, it is a

matter of degree; the less the contraction the more nearly the delivery approaches normal. With a true conjugate of 9.5 cm. there is scarcely any difference. Yet much depends on the size and plasticity of the child's head. The smaller and more plastic it is, the easier it will be for it to pass through the contracted pelvis, so



Fig. 219.—Simple rachitic pelvis. Twin pregnancy. Cesarean section. (Author's case.)



Fig. 220.—Colored woman with flat rachitic pelvis.

that a small child, a twin for example, or a premature fetus, experiences no difficulty getting through a pelvis of moderate contractions. Again, if the ossification of the cranial bones is not greatly advanced, the volume of the head may be decreased by compression and overlapping of its bones, thereby making birth rela-



tively easy as compared with a more mature head, one that is hard and unyielding. The various presentations of the head also play an essential part. For example, a brow presentation, which is not generally counted to be a favorable one, may in certain forms of contracted pelvis, be peculiarly adapted to pass the narrowed conjugate.

In the flat pelvis and its equivalent forms, the essential difficulty lies in the obstruction offered by the promontory. Should the posterior parietal bone become blocked by it, the anterior part sinks into the pelvis, the posterior tablet is pressed under the anterior, and the transverse diameter of the head is reduced, thereby permitting the head to enter the pelvis. Thus, instead of the larger diameter of the biparietal, the smaller one of the bitemporal, which is about 1 cm. smaller, enters the superior strait.

The generally contracted pelvis, frequently referred to as the pelvic inlet by one or the other of its parietal eminences. Whichever one meets with opposition first, becomes fixed; the other character becomes more impassable than the flat form, if the true conjugate measures the same in both instances. Most authorities maintain that there is a potential difference of at least 0.5 cm. That is, the generally contracted pelvis, we will say, of 8 cm. offers as much opposition as does a flat pelvis of 7.5.

The most advantageous position is for the head to present at the pelvic inlet by one or the other of its parietal eminences. Whichever one meets with opposition first, becomes fixed; the other advances. If it is the promontory that is met with, the posterior parietal stops and the anterior (Fig. 221) goes on; and if it is the symphysis that gets in the way, the anterior eminence will be the one to be held back (Fig. 222). Molding, too, becomes more extensive where there is contraction; the bones are forced to overlap each other, and the whole head becomes compressed.

As soon as the head in its greatest diameter has passed the narrowed strait of the pelvis, the occiput turns to the front. From this point on descent does not differ materially from the normal, for, usually, in pelves of the flat type the outlet is relatively capacious. If one is able to say, as labor goes on, that the sagittal suture is approaching the median transverse line, and that the arrested parietal bone can be palpated in an increasingly larger area, there

is good reason to believe that labor is progressing satisfactorily.

In the obliquely contracted pelvis the occiput enters at the expanded portion where the head finds better accommodations for its comparatively broad biparietal diameter. In the kyphotic pelvis the smaller anterior part of the head, instead of the broader occiput, finds better accommodation under the pubic arch; and the contracted space at the pelvic outlet is thereby turned to advantage.

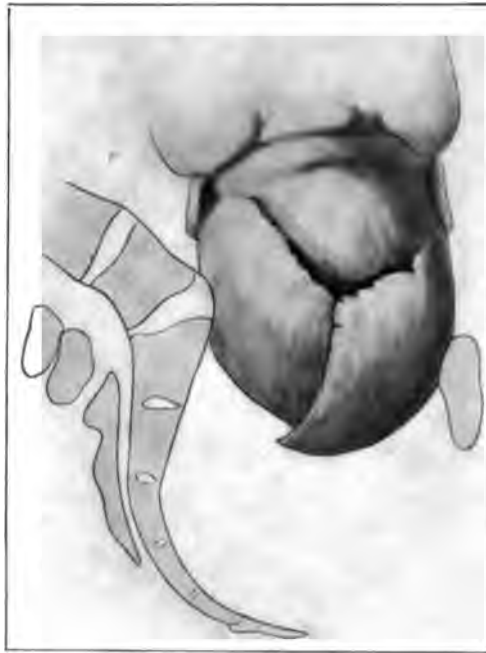


Fig. 221.—Head-molding. The posterior parietal bone, held by the promontory of the sacrum as the anterior bone slides past the symphysis pubis.

An essential part of labor, when complicated by pelvic contraction, is good strong pains; otherwise sufficient molding of the head can not be brought about.

In cases of labor complicated by contraction of the pelvis, the obstetrician must know and understand the relative proportional value of the mother's pelvis to that of the child's head; otherwise it would be impossible for him to offer an opinion of much worth as to the probability of labor ending spontaneously. An important help in this connection is a knowledge of the patient's previous parturi-

tional experiences, if she has had any; and the fact that she already has given birth spontaneously to a child is of great value in prognosticating the outcome of her present gestation. Due allowance should be made, however, for the tendency of subsequent children to become larger and their heads harder. Opposed to information gained through her is the fact that women who have passed through the experience of childbirth are seldom in possession of the true

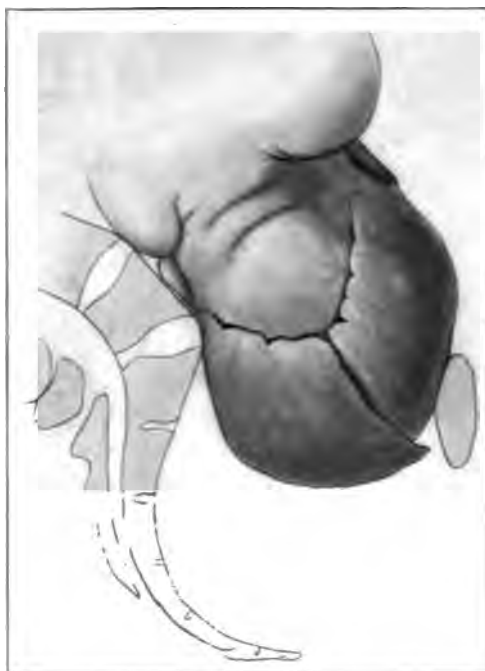


Fig. 222. - The anterior parietal bone, held by the symphysis pubis as the posterior bone slides over the promontory of the sacrum.

facts. Instead of relying on her statements alone, we must know of ourselves or from others who have attended her what mechanical difficulties were encountered.

At the beginning of labor the patient is advised to seek her bed in order that the advancing part of the fetus may not cause the premature rupture of the amnion, which, in a contracted pelvis, favors more than any other one factor, prolapse of an extremity or of the umbilical cord. If rupture seems about to occur, from the

presence of an increased quantity of water, it may be prevented by counterpressure with the colpeurynter. Preservation of the sac is desirable since the possibilities of infection are increased if the membranes are ruptured. If one has to deal with a vertex presentation, the pains being regular and strong, so that the birth seems likely to end spontaneously, the sac may be ruptured after complete dilatation of the cervix has taken place. It is only then that the real driving force of the pains, with consequent molding of the head, sets in. In rupturing the sac prematurely, precaution should

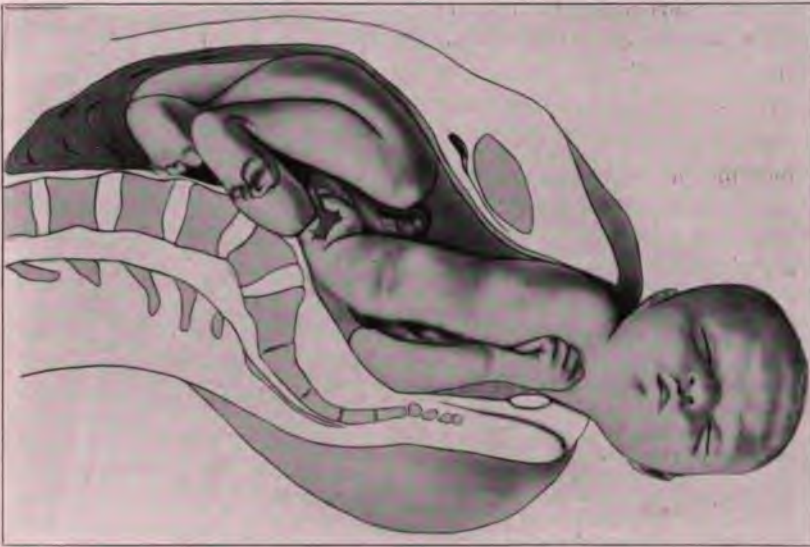


Fig. 223.—Molding of the shoulders. A study in frozen section (Zweifel). The mother died with the child partly delivered. Shows the relation of the parts at this stage of labor.

be taken to prevent the cord from coming down with the water. To this end the liquor amnii should be allowed to discharge itself slowly.

During the stage of expulsion there are certain advantages to be gained by putting the patient in the Walcher hanging position. (Fig. 7.) By rotating the pelvis in the sacroiliac joint in this way, it is possible to increase the conjugate diameter about three-fourths of a centimeter. The posture, however, is too uncomfortable to be long endured. While not so effective, some movement of the joint

is secured by placing a firm pillow under the patient's back just above the pelvis as she lies in bed.

Attention should be given to the effect of labor on the lower segment of the uterus. Because of its great attenuation, there is increased danger of rupture. The contraction ring becomes prominent, and takes a high position in the uterus. Frequent and careful auscultation of the fetal heart must not be neglected, for its altered rhythm and tone may demand the peremptory termination of labor.

By no means does every case of labor in a contracted pelvis call for interference. If the contraction is but moderate and the child is of average size, if the presentation and position are favorable, if the pelvis is strong and effectively supported by abdominal pressure, the greater proportion of such labors will terminate spontaneously and favorably. At any rate, nature should be given every possible chance to complete the process. But just how long one may safely put off "doing something" is, at best, rather indefinite. Fixed rules are hard to formulate, so much depends on the circumstances of the case in hand, the technical skill and experience of the operator, and the ripeness of his obstetric judgment. Unquestionably, many cases of contraction are handled surgically that would, were they left alone, end spontaneously. Just as truly, other cases left alone have ended disastrously, which might have been prevented by intervention. Generally speaking, though, patient waiting is the safer policy to pursue. In the case of a woman who has been through the procedure before, whose true conjugate measures 8.5 cm. or more, the child large, and the head refusing to engage, the patient herself giving a reliable history of pelvic dystocia, version and extraction are believed to be indicated. In the hands of an experienced obstetrician the procedure is undoubtedly a good one, and will always hold a high place in the therapeutics of these borderline cases. Another, more skillful with the forceps, perhaps, would elect to try instrumental delivery instead of version.

There is this to be said of version, however, as compared with high forceps, that, when once the child is turned and extraction has begun, there is no alternative but to go ahead with the extraction regardless of consequences. With the forceps this is not the case. After a reasonable effort to deliver by this means, other measures may be tried; a tentative trial does not preclude pubiotomy,

cesarean section, or even version, should one or the other of these operations subsequently become expedient.

Another procedure, one apt to be overlooked in these days of surgical ascendancy, is the induction of premature labor. Before the child has become fully developed, while it is yet able to pass through the pelvis, premature delivery may permit the birth of a viable child.

Still another measure, even more prophylactic, is to be found in the diet, especially during the last two months of pregnancy. As far as possible carbohydrates are withheld, and liquids decreased. Such a diet is recommended by Prochownik.\* In following this regimen it is essential that the bodily condition of the mother be watched closely, in order that she may not suffer from severe weakness.

A rather frequent accompaniment, not necessarily a complication, of contracted pelvis, is a pendulous abdomen with flaccid walls, which permits the uterus to fall forward. Because of the deflected axis, such a condition interferes with presentation; also, there is associated with and largely responsible for, such pendulosity, a lordosis of the lumbar vertebrae. After labor has continued for some hours with the head presenting by the posteroparietal eminence, as it is most likely to do, the sac ruptured, and the anterior eminence refusing to enter the pelvis, version and extraction may still be carried out.

The use of forceps in contracted pelvis comes into consideration only when the head has already entered the pelvis by its greatest diameter, or is about to enter. In contractions of the outlet, forceps avails nothing if the transverse diameter is less than 8 cm. Besides, it is a serious undertaking and is likely to end in the loss of the child. There is also much danger of rupturing the symphysis pubis of the mother. This is one situation where perforation and cranioclasia has some right to consideration, even if the child is alive. The chances are, that the head will be crushed anyway; therefore, rather than drag it through a contracted pelvis at any cost, one might better perforate.

\*Breakfast: a small cup of black coffee, 100 c.c.; zweiback or bread with a little butter, 200 gm. Luncheon: any kind of meat or fish, eggs, green vegetables, salad, cheese. Dinner: same as luncheon, with addition of bread and butter, 30 to 50 gm. Fluids: as much per day as a pint of water, or of red or Moselle wine, if the patient is accustomed to the use of wines. See fuller discussion of this diet in Jour. Am. Med. Assn., Oct. 28, 1911, p. 1474.

In dealing with contractions of this degree (down to 8.5 cm. true conjugate) two rules, if followed, will save many lives: (1) Have the patient in the hospital, and (2) maintain expectant support to the limits of safety.

### **FURTHER OBSERVATIONS ON CONTRACTIONS OF THE PELVIS**

With the possibility of cesarean section becoming necessary, it is desirable that no examination be made through the vagina, as it adds greatly to the risks of the operation. Advancement of the head can be made out externally and by rectal touch.

Abnormal presentations (breech, face, brow, shoulder,) are many times more frequent than in normal pelves. Prolapse of the cord, arm, and foot are also more common.

The caput succedaneum becomes very large, so that the scalp may reach the vulva before the head has passed the superior strait.

Exhaustion may be so great as to result in death. Great watchfulness, therefore, is demanded lest mother or child perish from too long a test of the natural forces. Two or three careful examinations in the space of five or six hours will suffice to show whether or not progress is being made.

In a contracted outlet a posterior position of the vertex is not an unfavorable one, since the wide parietal part of the head can find better accommodation back of the intertuberal line than in front of it. In other words, there is more room along the sacrum than under the pubes.

### **Statistics**

Of 300 cases of contracted pelves which in recent years have been dealt with at the Koenigsberg Clinic, 258 were flat rachitic pelves; 32, general symmetrically contracted; 7, obliquely distorted; 3, kyphotic.

In the course of birth the following complications were noted:

Premature rupture of the amnion	53
Infection fever	23
Uterine inertia	16
Abdominal pendulosity	4
Posterior parietal presentation	14

Transverse position	13
Face position	1
Sinciput position	2
Prolapsed arm in vertex position	3
Prolapse of the cord in vertex position	19
Threatening rupture of the uterus	11
Spontaneous rupture of the uterus	2
Old symphyseal rupture	1
Vaginal scar after vesicovaginal fistula operation	1
Asphyxia	46

Besides these complications there were:

Eclampsia	2
Placenta previa	4
Premature detachment of the placenta	2
Retention of the placenta	2
Atony	8

Operations performed:

Induction of premature labor	10
Rupturing of the amnion	5
Use of the colpeurynter	5
Use of the metreurynter	13
Forceps (following Hofmeier's impression)	17
Extraction	12
Version and extraction	48
External version on the head	1
Combined version	3
Kristeller's expression	1
Perforation and cranioclasis	10
Perforation of the after-coming head	9
Pubiotomy	17
Abdominal cesarean section	3
Dilatation after Bossi	1
Cervical incision	3
Reposition of an arm	2
Reposition of the cord	1
Manual detachment of the placenta	2
Uterine tamponade after rupture	1
Uterine extirpation after rupture	1
Puncturing of a hydrocephalus	1

The mortality in the cases managed by operation was:

Maternal	2.5 per cent
Fetal	30 per cent

(Abstracted from Hammerschlag.)



## CHAPTER XXVII

### ECLAMPSIA

Under the head of eclampsia, nothing but the management and treatment of the disease will be considered. Its etiology is locked up in too great obscurity to warrant here a lengthy discussion of its causation. Whatever it may be that leads to its development, cure, in most instances, lies in emptying the uterus. How and when this shall be done will form the basis of this chapter.

### TREATMENT

**Eclampsia First Appearing During Labor.**—If the mouth of the womb is fully dilated, or nearly so, when the first convulsion occurs, labor may be terminated either by version and extraction, the application of forceps, or, if the child is dead, by perforation and cranioclasia. In case the cervix is not fully dilated, delivery may be expedited by making one or more incisions in the resisting os. The disease, unfortunately, does not always wait for so favorable a time to make its appearance. More frequently it bursts into action at or near the end of pregnancy or just as labor begins, when it is not possible to put such simple procedures into execution. It then becomes necessary to do other things which ought to be undertaken only in the hospital. For this reason one will do well to adhere to the following rule: *If eclampsia makes its appearance during pregnancy or at the beginning of labor, the patient should at once be taken to the hospital, and a surgeon called.* Even if the distance is considerable or the means of conveyance are lacking in comfort, the hospital is the place for her, for experience has shown that an eclamptic's chances of recovery are better there than at home. In the hospital it would be possible to carry out that sovereign operation, cesarean section, either vaginal or abdominal; but the risks are too great to warrant so formidable an undertaking in a private house. Sometimes the transference of the patient is refused or, for

some good reason, is thought to be impracticable. There is then no alternative but to do the best one can under the circumstances. With the technic well understood and the operation carefully performed, the results of artificial dilatation of the cervix are nearly as satisfactory as cesarean section; and artificial dilatation is not counted too serious a procedure to be carried out at home.

Sometimes one may find it expedient to dilate by means of the child's body,—he may be able to get hold of a foot and by making traction thereon dilate the canal from above. The method, however, has little to recommend it other than as a means of saving the mother, which usually is paid for by the life of the child. Another and safer way for both mother and child would be to dilate with the metreurynter, more definite use of which is described on pages 78, 399. Before beginning this procedure, it is important that the amnion be first ruptured; otherwise the added volume of the bag endangers the already distended uterus.

Before undertaking any operative procedure, exploration, or even disinfection, the patient should first be narcotized. To proceed without anesthesia would be to excite needlessly a convulsive seizure. And in this connection it may be remarked that clear chloroform is not as safe an anesthetic in eclampsia as a combination of chloroform, alcohol, and ether, in the proportion of three parts of chloroform to one each of the other two (Billroth's Mixture).

**Eclampsia Occurring During the Earlier Months of Pregnancy.**—Eclampsia occurring before the child is viable, may, in some instances, be temporized with, and treated after the method of Stroganoff. If the eclamptic seizure is light, and the mother's general health good, one may, through stimulation of the secretory functions, accompanied by moderate narcosis, succeed in curing the attack and carrying the case safely to term. The undertaking, however, is venturesome, and is to be recommended only when the conditions are exceptionally favorable. The toxic state remains a menace that can, on slight provocation, take an unfavorable course.

While the most effective therapy in eclampsia is the emptying of the uterus, there are many additional things to be done for the patient, both protective and eliminative. She should be kept in a darkened room and where the surroundings are quiet. Anything

likely to irritate or excite should be avoided; examinations, slamming of doors, loud talking, jarring of the bed, are things that may precipitate a convulsion. There should be at hand something to put between the teeth to keep them from biting the tongue when the fit is on. For this purpose a rubber wedge is perhaps the best device, but a covered spoonhandle or a wooden clothespin answers the purpose. Otherwise the patient should be undisturbed during the seizure. In a long-continued unconsciousness the mouth should be washed out occasionally with a mild antiseptic lotion.

For the promotion of metabolism and the elimination of toxins, various measures are recommended. The hot bath, lasting from twenty minutes to half an hour and followed with the dry warm pack, causes profuse perspiration, and thereby furnishes one means of elimination. The hot wet pack has a similar though somewhat weaker sudorific effect, but it has the advantage of disturbing the patient less. The blankets are left applied for fifteen or twenty minutes without change, and the treatment continued for a period of an hour or two. Much of the edematous fluid can be removed through the skin in this way. Accompanying this treatment 500 to 750 c.c. of physiologic salt solution may be given by hypodermoclysis.

The author is one of those who believes strongly in the therapeutic value of *veratrum viride*. In a patient with a full, high-tension pulse, he has found it little short of a specific as far as controlling the convulsions is concerned. The initial dose may be as high as 15 to 20 minims of the tincture, given hypodermically. The drug is repeated in 10 minim doses every thirty minutes to two hours until the eclamptic seizures have subsided for at least six hours. The instruction given the nurse is to repeat the dose as often as it may be necessary in order to bring the pulse down to 65-70 beats per minute, and keep it there.

If the somnolence is deep, the cyanosis outspoken, and, especially, if there is a beginning edema of the lungs, a vein should be opened and 300 to 500 c.c. of blood abstracted. It is well to follow the venesection with hypodermoclysis. Should the symptoms be so grave as to occasion tracheal râles, the patient's head is brought over the edge of the table or bed, and the accumulated mucus swabbed from the mouth with gauze sponges made fast in a probang. The cyanosis continuing, inhalation of oxygen (1 liter

per minute) may be continued indefinitely or until oxygenation of the blood becomes apparent. In desperate states of toxemia the respiration becomes irregular and shallow, or, perhaps, ceases altogether. Then the pulmotor and the artificial aeration of the lungs, massage of the heart and flicking of the body with cold wet towels come into use. At the same time camphorated oil in ten minim doses may be given hypodermically or intravenously every half hour. Digitalin is another serviceable drug of similar action.

One must be particularly exact concerning the amount of urine secreted in eclampsia. It will hardly do to depend on the statements of the patient herself as to how much water she passes. Such information should be obtained through catheterization of the bladder. An attempt to restore the activity of the kidneys is made through hypodermoclysis, as much as 1,500 c.c. of normal saline being introduced subcutaneously. Failing thereby to relieve the nephritic tension, decapsulation of the kidneys may be considered.

It is not unusual in practice for one to be in a position to deal prophylactically with conditions that threaten, and to apply measures in anticipation of an outburst of eclampsia. Especially should a patient with nephritis be under close observation, and explicitly directed as to kidney conservation.

### MORTALITY

In studying the statistics of eclampsia the mortality appears to be highest when labor has been allowed to pursue its own course. The death-rate in such cases runs as high as forty per cent. The next highest rate is found in a class of cases where labor is permitted to go on spontaneously up to the point of full cervical dilatation, when forceps, version, or some other operative means of delivery is employed. The best results, however, follow the rapid emptying of the uterus, either by means of the vaginal cesarean section or the rapid dilatation of the cervix as described herein under the head of "Cervical Dilatation." The mortality in a series of several hundred cases dealt with in this way was not above 13.5 per cent. with a slightly better percentage for section than for dilatation.

## CHAPTER XXVIII

### BIRTH COMPLICATED BY TUMORS

The increased supply of blood to the parts, the stimulated metabolism, and other impulses of growth—all have an effect during pregnancy to bring about changes in the genitalia. Most of these changes, however, are transitory; but occasionally tumorous formations take birth, and old ones receive new life. The essential thing about such growths, as far as we now are concerned, is not so much the alteration they undergo through the influence of childbirth as the obstruction they offer to the process of birth itself. We shall, therefore, look at the subject mainly from this point of view.

#### OVARIAN TUMORS

An ovarian tumor becomes an obstruction to birth whenever it obtrudes itself on the birth canal, which it may do if it becomes pedunculated (Fig. 224).

The treatment is usually one of replacement. If this is not possible, the tumor must be removed by operation. The attempt to restore it to the abdominal cavity, however, should not be abandoned before making a thorough trial under narcosis. Not succeeding without it, the patient should be anesthetized, placed in the Trendelenburg position, and the whole hand introduced into the vagina. The danger of rupturing the cyst or of tearing it loose from its pedicle, must be borne in mind, for such an injury complicates matters considerably, both by hemorrhage and by infection.

Failing to get the tumor out of the way by means of manipulation, surgical procedures become necessary. This means that the abdomen must be opened, and an ovariectomy performed. If the tumor is found to be adherent and the pelvis small, the child should first be delivered by a hysterotomy and the tumor removed afterward. To do otherwise would make it necessary to turn the pregnant uterus out of the abdomen and flex it strongly over the symphysis, which would probably result in the loss of the child. Even if

the child is dead, it is better to reduce the size of the uterus by section before proceeding with the ovariectomy. The attempt to remove an ovarian tumor from below should be made only when it is soft and free from adhesions, and lies in front of the cul-de-sac. The operation then becomes comparatively simple through a posterior colpotomy.

A tumor of the ovary can be removed during gestation without very great risk of interrupting the pregnancy; and it should be removed. Not to remove it is inadvisable because of the danger that



Fig. 224.—Ovarian cyst obstructing birth.

accompanies the stretching and twisting of its pedicle, not to mention the complications that may arise from it at time of labor.

Ovariectomy performed at this time has no greater mortality than at other times (4 per cent to 5 per cent). The usual history of an ovarian tumor of pregnancy is somewhat as follows: In the third month of pregnancy an unaccountable pain in the abdomen is complained of, and the patient herself will probably surmise that something unusual is developing because of the peculiar swelling in one side of the abdomen. Upon consulting her physician a cystic tumor attached by a pedicle to the uterus will be found. Convalescence following operation is usually rapid, pregnancy goes on, and, in due time, birth takes place.

### UTERINE MYOMATA

In considering the influence myomata may have on birth, it is well to divide such growths into those of the upper and those of the lower segments of the uterus. Obviously, only those of the

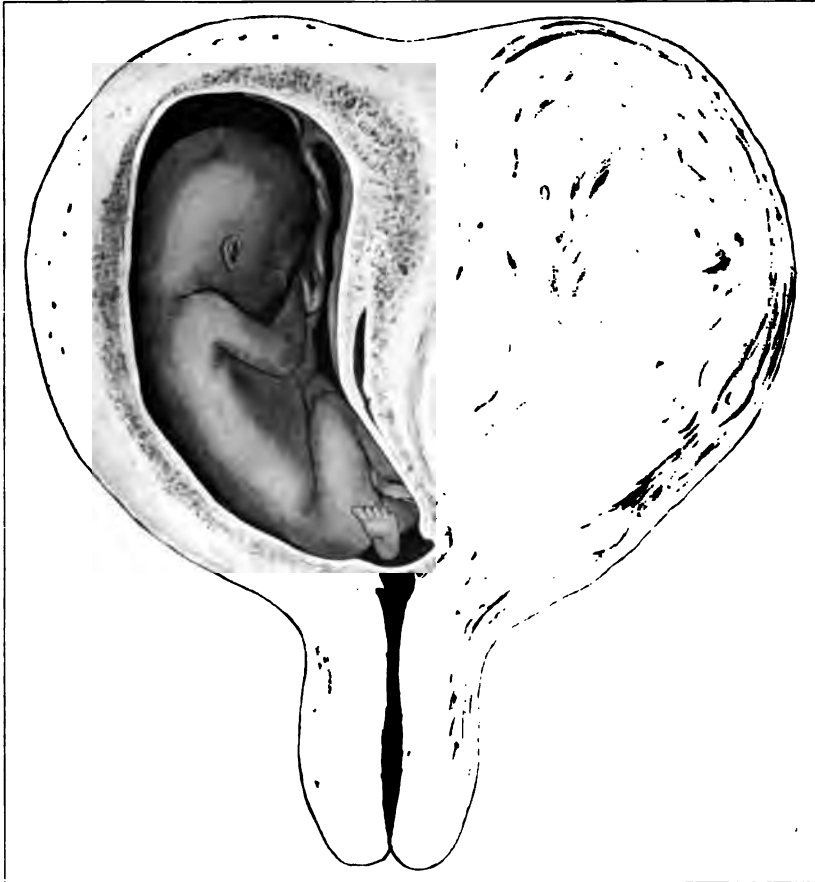


Fig. 225.—A large myoma complicating pregnancy. (Runge.)

latter sort can become obstructive. The influence of the other is mechanical, but only in the sense that it can cause an unfavorable position of the child. Owing to the disturbed uterine contractions, such a tumor has the further effect of prolonging labor; and in the third stage, especially if the placenta has its attachment over

the myomatous area, expulsion may be considerably delayed (Fig. 225). On the other hand, myomata may occasion so little trouble during parturition that they are not discovered until afterward. Their presence is frequently confused with parts of the child, and can be distinguished from them only by painstaking examination.

So far as pregnancy itself is concerned, myomata of the uterus seldom demand attention, though such tumors may sometimes be serious enough to require independent surgical treatment. It



Fig. 226—A submucous myoma of the lower segment of the uterus lying in advance of, and acting as an obstruction to, the head. (Kerr.)

should be the aim of the obstetrician, however, to preserve the product of conception whenever possible. The submucous myoma, like a polypus, protrudes from the uterus in front of the advancing child, and is easily removed. If the pedicle is thin, the passage of the head will probably tear it loose. The interstitial and subserous myoma, on the other hand, can become exceedingly troublesome, even obstructive. (Fig. 226). Not uncommonly, though, the tumor is so small that the uterus will, as its lower segment recedes,



pull the growth along with it to a point of safety above the brim, where it becomes flattened out sufficiently to allow the child to pass. If such a tumor moves the other way, that is, remains in the pelvis, its removal becomes necessary before birth can go on. With the patient in the knee-chest position, or lying on the back with hips elevated, the whole hand of the surgeon is passed into the vagina, and moderate pressure made with it on the tumor, the object be-

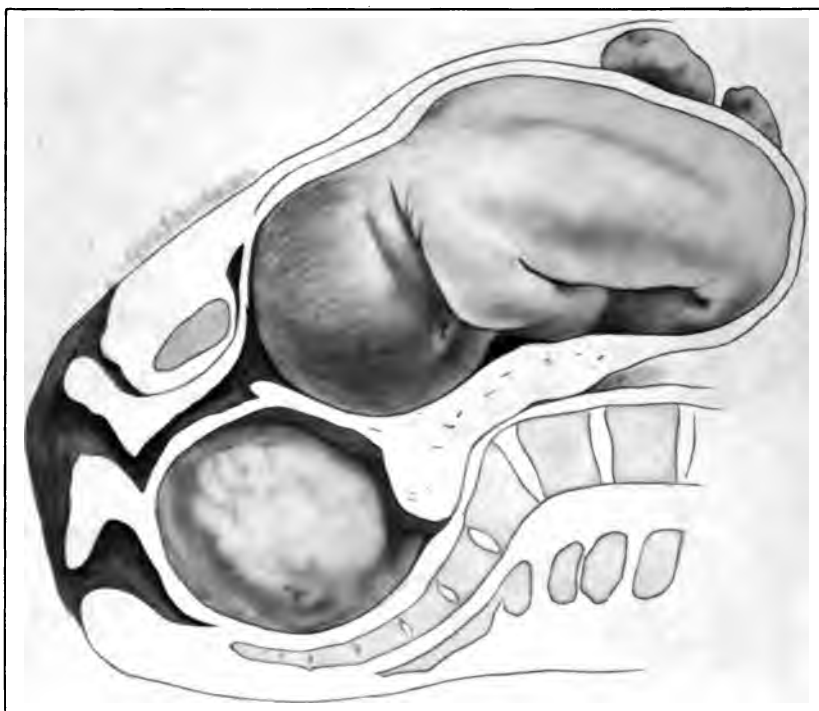


Fig. 227.—An obstructing myoma. (Bumm.)

ing to force the obstructive object above the inlet. The pedunculated subserous myoma is most favorable for reposition (Fig. 227). But if it can not be reduced, laparotomy becomes necessary: the tumor is enucleated, the wound is closed, and the child delivered naturally. As in the case of ovarian tumor, it may be advisable, because of the difficulties encountered, to first deliver the child through section of the uterus. After the incision is closed, myo-

mectomy becomes easier to perform and the child is out of danger. The tumorous growths may be so extensive as to warrant hysterectomy; and, besides, there may be an infection of the uterus to consider.

### CARCINOMA OF THE UTERUS

Carcinoma of the uterus complicated by pregnancy, or pregnancy complicated by carcinoma of the uterus,—it is difficult to say which of the two is the complication,—constitutes a very unfavorable and serious condition. Proliferation is so rapid under the influence of gravity that a carcinoma which before was operable soon becomes inoperable. This might not be so true if the carcinoma were of the body of the uterus, but conception does not occur under such circumstances; it can exist only when it is the cervix that is involved.

A carcinoma during pregnancy is treated precisely the same as it would be at any time. If operable at all, the procedure should be radical and immediate. Undoubtedly the most satisfactory method is to operate through the abdomen, completely removing the uterus, the parametrium, and the vault of the vagina. If gravity is of the first few months, hysterectomy can readily be done without first opening the uterus; but in the later months the fetus should be delivered first, especially if there is any possibility of its living.

The abdominal operation, as compared with the vaginal, is accompanied by a slightly higher primary mortality, but otherwise it is the more satisfactory procedure of the two. As to whether the uterus shall first be opened and the fetus removed depends on the time of pregnancy, and the preferences of the operator.

In the other class of cases, that is, the inoperable carcinoma, the welfare of the child alone is considered; but at the same time the mother's condition is kept at as high a level as possible. Marked local fetor is treated with disinfecting and deodorizing douches of potassium permanganate or hydrogen peroxide, or by insufflations of some such powder as dermatol. Severe bleeding may require cauterization of the cancerous surfaces. This, however, would be very likely to interrupt pregnancy, and should be done only in exceptional cases. The final delivery should always be through abdominal section; to undertake it through the vagina would be much more difficult, as well as more dangerous.

### TUMORS OF THE VAGINA AND VULVA

Rarely, yet often enough to deserve consideration, birth may be obstructed by tumors of the vulva and vagina. Cysts, solid tumors, especially the fibroma and fibromyoma, carcinoma, and even swellings, such as edema and varicosities, may be of sufficient size and importance to present a very formidable barrier. A vaginal cyst is seldom large enough to be seriously in the way; but when it is, it



Fig. 228.—Edema of the vulva.

should preferably be removed before labor, for otherwise it will need to be punctured during labor. Solid tumors, if they reach considerable size, can be enucleated intrapartum.

Edema of the vulva can be so great that not only is the passage of the child made difficult, but the tissues themselves become so overstretched that their elasticity is gone and laceration occurs easily (Fig. 228). Scarification would better be performed before labor begins, but it may be done at any time.

Other troublesome swellings arise from gonorrheal infection,

such as the formation of an abscess in the vulvovaginal glands. This would not act seriously as an obstruction, but it might become a focus of infection. To escape this danger the cyst should be cured, when possible, before labor comes on, for eventually it will have to be incised and packed. During labor it is treated with antiseptic applications, in order to prevent as far as possible spreading of the infection. Condylomata about the vulva and perineum may attain the size of a fist, and, because of their sinuositities, become sources of infection. Moreover, such growths greatly interfere with the elasticity of the parts, and should be destroyed during pregnancy. Where a patient comes to labor with such masses about the vulva, all that can be done is to keep them disinfected as well as possible.

Varicose veins are often of considerable size, but seldom become obstructive. If they rupture, severe hemorrhage may result, and thus make numerous ligations necessary.

A number of other and intrinsic conditions can also act as barriers. A carcinoma of the rectum, for example, can be so extensive as to make cesarean section imperative. A large stone in the bladder or an extrauterine lithopedion has in the same way been known to effectively prevent natural birth.

## CHAPTER XXIX

### MALFORMATIONS AND ANOMALIES

#### **MALFORMATIONS AND ANOMALIES OF THE MATERNAL SOFT PARTS**

Pregnancy in a double uterus occasions little trouble unless an obstructing ledge of tissue projects into the birth canal. It could then interfere with the performance of version, and add to the difficulties of the third stage. Nor does pregnancy in a bicornate uterus cause serious interference with birth. It behaves like a normal pregnancy except that it may favor an abnormal presentation of the child. The empty horn may become obstructive much the same as a subserous myoma. A vaginal septum is pressed to one side, but if it should stand in the way, it can easily be resected between ligatures. In like manner other malformations and contractions may block the way. Scar tissue, for example, is sometimes so unyielding that the child can not get past it; and even the hymen offers considerable resistance at times.

#### **MALFORMATIONS AND ANOMALIES OF THE CHILD**

**Anencephalus.**—This relatively frequent malformation (Fig. 229) offers very confusing diagnostic features, especially when the head is the part that presents: abdominal palpation reveals nothing characteristic, and a vaginal examination is often misleading.

It is characteristic of an anencephalic monster that the shoulders, more than the head, are the parts most difficult to deliver. If the obstetrician is not able to bring them down with the fingers, he can not be condemned if he uses the blunt hook; and, in case it becomes necessary to remove an arm or sever the clavicle, he need have no compunction about doing it, for the child can not live anyway. The shoulders also cause trouble when such a fetus is born in

the breech position. But one can not then proceed with so little regard for the safety of the child, because the malformation is not discoverable until the head is born.

**Hydrocephalus.**—This is a more serious complication than anencephalus. The maternal mortality is not far from 20 per cent, a large proportion of the deaths being due to rupture of the uterus. The gravity of the condition would not be so great if the diagnosis of hydrocephalus could be made earlier. There are so few symptoms of the disease that one does not suspect it until after labor has seriously weakened the uterine muscle. (Fig. 230.)



Fig. 229.—Anencephalus.

The hydrocephalic head, unless it is of mild degree, can not be born without first being emptied of its contained fluid, which may be done with a trocar, perforator, or other instrument passed into the head between the widely separated bones or through a fontanel. After the water has drained away, the pains usually become stronger, and very often birth goes on normally. If birth does not progress as it should, a dose of pituitary extract ought to be tried before resorting to further operative measures. The forceps is of little or no advantage, because of the collapsed state of the head, so that other instruments, such as bone forceps or the cranioclast,

are preferable. Sometimes the osseous structures of the head give way, and have to be removed piece by piece, after which an arm can be brought down and the body extracted. If preferred, a claw forceps may be fastened to the most secure place in the parts presenting, a weight attached, and the fetus delivered by a slower process. Version and extraction is rarely indicated. One may attempt to deliver a hydrocephalus of mild degree with forceps, but the instrument must be used with great caution, for the blades



Fig. 230.—Hydrocephalus. (Bumm.)

easily slip off the head, and in doing so may cause much injury to the mother from their violent and untimely action.

A hydrocephalic head coming last always requires to be perforated, the operation being somewhat more difficult than when the head presents (Figs. 231 and 232). Occasionally there is a coexisting spina bifida, through which a catheter may be passed into the meninges, and paracentesis thus effected. Otherwise perforation is performed in the usual way.

Hydromeningocele and hydroencephalocele offer the same obstacles to birth and demand the same treatment. To diagnose these conditions before birth, however, is extremely difficult.

As stated above, the outlook for the mother in these "water-head" babies would be better if the diagnosis could be made earlier. This, unfortunately, can not often be done by the ordinary bimanual examination, especially if the fetus presents by the breech, as it so commonly does in this condition. The whole hand must first be passed into the uterus, and the abnormal size of the head



Fig. 231.—Draining off the water from a hydrocephalic head by means of a catheter introduced through a puncture in the spine.

with its wide sutures and fontanelles made out. And, surely, one should not undertake paracentesis without first having done this.

**Teratoma of the Body.**—Delivery can sometimes be made exceedingly difficult through accumulations of fluid, and from other anomalous formations of the fetus. Even after the head or breech is born, further delivery may become impossible unless such growths be removed. Chondrodystrophia fetalis, or fetal rickets, for ex-



ample, is a condition that can be so extensive as to require operative intervention before birth can be completed.

**Double Monsters.**—The birth of such an anomaly as the double monster may lose its obstetric significance because of the underde-

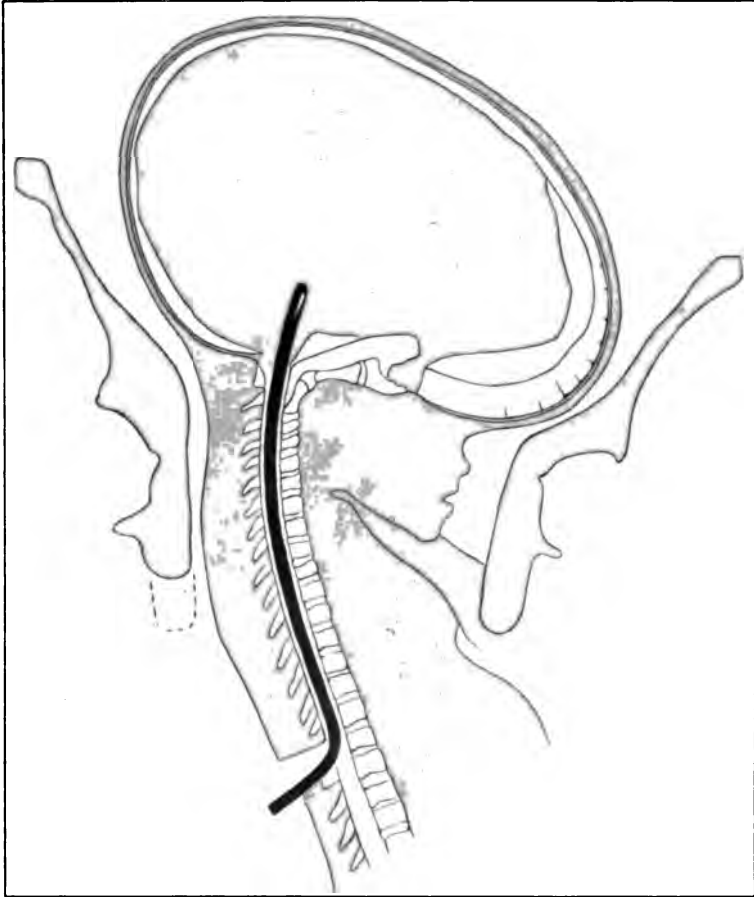


Fig. 232.—Cross section of Fig. 232. (*American Text Book of Obstetrics.*)

velopment of the monstrosity. Frequently the birth of such a fetus is premature, though instances are on record of such children being born at term and then only upon performing cesarean section. The rarity of the condition makes the diagnosis particularly difficult. In one case known to me, a double monster was diagnosed

as twins. Finding it impossible to deliver with forceps, although the pelvic diameters were large, cesarean section ultimately became necessary. Precise rules to govern such cases can not be laid down. To sacrifice a child's life is always deplorable, yet one would be justified in performing embryotomy if one could be certain of having a monstrosity to deal with. This is, as has been stated, not easily made out, and the diagnosis admits of many mistakes.

## CHAPTER XXX

### SPONTANEOUS ABORTION

Spontaneous premature interruption of pregnancy oftentimes carries with it conditions and consequences that make operative procedures necessary. The nearer to term the interruption occurs, the less deviation from normal is the process of expulsion. Conversely, the earlier in pregnancy, the more frequent are the variations, particularly if the interruption occurs within the first trimester. The small size of the embryo and the undeveloped state of the uterus tend to make spontaneous expulsion difficult and surgical interference necessary. The natural forces, however, should first be given a fair trial.

### DIAGNOSIS

The appearance of blood in the early months of pregnancy is suggestive of abortion; accompanied by pain, it becomes more so. Whether pregnancy is about to terminate depends on the character of the pain, and, to a lesser degree, on the amount of blood. The regular occurrence of uterine contractions with increasing frequency and severity is further indication that an abortion is taking place; and bright blood in any considerable quantity means the detachment of the embryo. When the blood is of a brownish tinge and is mixed with mucus, it is more indicative of an affection of the endometrium or of the ovum itself. The pain and bleeding is followed by dilatation of the internal os. A patulous state of the external os in the multipara has little significance, but in the primipara it may have considerable. Having made the diagnosis of impending abortion, it becomes necessary to determine how far it has advanced, since its further management depends thereon.

A very common classification of abortion is as follows: (1) threatened, (2) inevitable, (3) incomplete, and (4) complete.

**Threatened Abortion.**—An abortion is said to threaten when there is only pain and hemorrhage. At this stage it is sometimes

possible to prevent the abortion going further. The patient should remain in bed, and the attempt be made with opiates to quiet the uterine activity. For this purpose half-grain suppositories of codein, given per rectum every four hours, are recommended. Teaspoonful doses of viburnum prunifolium, given three times a day, is believed to have a good effect in preventing abortion. Local treatment of any sort is contraindicated.

**Inevitable Abortion.**—The ovum is here still intact, but the internal os has opened so that with the finger one can feel the round structure of the ovum in the uterus. There is also to be made out at this time a peculiar succulence of the uterus, due to the congested state of the organ. A foul-smelling discharge soon follows, especially if the ovum has been infected.

An abortion that has gone thus far can not be arrested; but it is perfectly proper to allow the natural forces to complete the process, and only in exceptional cases, where the hemorrhage is severe or the discharge particularly foul, is it necessary to remove the ovum.

**Incomplete Abortion.**—It is the incomplete form of abortion that most frequently requires surgical treatment, since in these cases portions of the retained ovum need to be removed from the cavity of the uterus. It is impossible to say how much is yet remaining, particularly if the cervical canal is contracted. Sometimes one is fortunate enough to have had saved for his inspection all that comes away. He can then judge of its completeness. With the cervix dilated wide enough to admit the examining finger, confirmation becomes relatively easy.

**Complete Abortion.**—An abortion is said to be complete when the uterus has returned to its normal size and hardness. As already stated, the spontaneous completion of an abortion is the most favorable course for it to pursue,—either the expulsion of the ovum *in toto*, or first the embryo and then the placenta. This, however, does not always occur. Left entirely to itself, the process may extend over weeks or even months, and be accompanied by great loss of blood. The bleeding from a prolonged incomplete abortion, though seldom the immediate cause of death, can be the occasion of a severe anemia that ultimately may lead to death. The amount of blood lost and its consequences, therefore, constitute no inconsiderable part in the prognosis. The bodily temperature and discharges must be

watched closely for any signs of infection, especially if the abortion is treated expectantly. Surgical interference becomes necessary whenever the retained ovum ceases to be innocuous or the spontaneous completion of the process does not follow in a reasonably short time. A criminally induced abortion, as compared with the spontaneous, is of much more serious import, because of the non-aseptic conditions under which it is commonly performed. In the presence of a genital lesion there may follow a true septic process, such as a metrophlebitis or a parametral exudate; and, as we know, it sometimes ends in general septicemia and death.

A simple saprophytic process does not necessarily demand treatment, yet it is considered proper to clean out the uterus; but much depends on the circumstances, surroundings, and conditions under which it is done, for, in removing the decomposing ovum, which in itself may not be dangerous, other and more virulent germs may be introduced, or an infection that has remained inactive may become lighted up by intrauterine manipulations. Therefore, as little local investigation as possible should be undertaken, and whatever is done should be done surgically and thoroughly. To prolong any of the procedures is to encourage infection.

On the other hand, an infection may have already gone beyond the walls of the uterus, even into the blood stream. It then becomes impossible to remove more than a part of the infectious substance, and imprudent to attempt it. Much manipulation serves only to force the infection further into the tissues. Such an instance is the following, which is by no means, unique:

A young woman in the fourth month of pregnancy was admitted to the municipal hospital, presumably infected by a criminal abortion. The abdomen was tympanitic, the lower part especially being very sensitive to touch. Temperature, 103.2°; pulse, 130. Two fingers dilatation. Within the canal could be felt the lower extremities of the fetus. Extraction easy; placenta loosened with the finger and expressed. Immediately following this the patient suffered a severe chill. General symptoms of infection continued to grow worse until she died, five days later. The bacteriologic examination showed a staphylococcic infection.

An infection with general symptoms and localized inflammation should be permitted to run a spontaneous course; although a bad general condition, accompanied by a severe hemorrhage, may demand more active treatment, even to the removal, vaginally, of the uterus and the drainage of the abdominal cavity. The same opera-

tion would be indicated if, after removing from the uterus, a septic ovum, a streptococcemia immediately supervenes.

### THE ACTIVE TREATMENT IN ABORTION

In undertaking any operative treatment in abortion the first thing to consider is the state of the cervix. If the cervix is



Fig. 233.—Pregnancy at three months. Note the increasing vascularity in the placental area and the length of the cervical canal.

closed, some procedure becomes necessary in order to open it; and the nearer such a procedure comes to the physiologic act of dilatation, the safer will it be.

**Packing the Vagina with Gauze.**—After painstaking disinfection of both patient and operator, the woman is placed crosswise on the bed or on an operating table, and a cylindrical speculum is introduced into the vagina and pushed as far up as it will go.

With a dressing forceps or a sponge-holder the vault and upper two-thirds of the vagina are packed with iodoform gauze, continuing its introduction as the speculum is being slowly withdrawn. The tampon is of particular value where the hemorrhage is severe and the cervix remains too tightly closed to admit the finger. After twenty-four hours there is little danger from further bleeding.



Fig. 234.—Three months' ovum with sac and placenta intact.

the canal will have opened and, as often happens, the entire ovum will, upon removing the tampon, be found lying in the vagina. (Fig. 234.)

A tampon in the vagina has one disadvantage, and that is, it acts as an obstruction to the discharges. It furnishes an excellent

protection from extrinsic contamination, but it does not always prevent further incubation of the germs already present. In order to minimize this danger as much as possible, the preparatory disinfection of the parts should be thorough. At the end of twenty-four hours the packing should be removed. Meanwhile the temperature must be taken regularly, and if it rises above  $101^{\circ}$  the tampon should be removed earlier and a disinfecting douche given.

**Dilating the Cervical Canal with Laminaria.**—The wood *laminaria digitata* has the property of absorbing moisture and becoming swollen. A pencil-like piece of it is introduced into the cervical canal and left for twenty-four hours, at the end of which time it will have swollen to the size of the finger. In preparing the tents the laminaria is first boiled for twenty seconds, and then kept in absolute alcohol until used. The outer end is furnished with a strong thread by which the tent can be readily drawn out of the cervix. Inasmuch as it takes many hours to effect dilatation, the applicability of the device is limited to such cases as require no particular haste.

**Dilating the Cervical Canal by Means of Metal Dilators.**—With the metal dilator it is possible to open the cervical canal to the size of the finger in a relatively short time. An objection to the method is, that the cervical tissues are sometimes injured through too rapid dilatation. Cautiously and intelligently used, however, the metal dilator is not a dangerous instrument, and its use is more dependable than either of the other two methods mentioned. (For the technic of the procedure see page 83.)

### Separating the Ovum from the Uterine Wall

The finger, after all, is the best instrument the obstetrician possesses. After careful disinfection the left hand is passed into the vagina, the index or middle finger continuing on into the uterine cavity through the now opened cervical canal. Whether the entire hand or only two or four fingers be introduced into the vagina depends largely on the passibility of the introitus and the capacity of the vagina. With one finger well within the uterus, the fundus is grasped with the other hand through the abdominal wall and forced down upon it from the outside. The cavity of the uterus may thus be palpated, and any adhering structure separated there-



from (Fig. 235). When all is loosened the wall feels smooth to the finger as it sweeps over its surface, the placental site alone remaining rough after the ovum has been detached. To continue applying the fingers to this area, hoping thereby to remove this roughness, would probably result in perforation of the muscle wall. Patho-



Fig. 235.—Reaming out the ovum with the finger.

logic adhesions are rare. The hydatidiform mole is an example of degeneration that can occasionally interfere with separation.

To separate the ovum with the curette is much more dangerous than to do it with the finger, and many instances are on record where perforation has accompanied its use. For this reason the instrument is of limited value in the management of an abortion.

Only when large portions of the ovum can not be dislodged with the finger should the curette be resorted to, and then very cautiously. The patient is prepared and properly placed on the bed or operating table. It is best not to undertake the operation without anesthesia, though it can be done if the woman bears pain exceptionally well. The portio vaginalis is exposed with the Edebohl speculum, and the anterior lip of the cervix is grasped with bullet forceps. After drawing the cervix well down, the length and breadth of the uterine cavity is determined by soundings. The canal is then dilated with the Leavitt instrument to the size of the index finger, or until a broad curette can be easily introduced. The curette is then cautiously passed into the uterus as far as it will go, and withdrawn, taking in a strip of the endometrium. This is repeated a number of times, and in a systematic way. Starting anteriorly, long parallel strokes are made back and forth, going a little farther to the side each time, until the whole inner surface from the fundus to the cervix has been gone over. When the entire mucous membrane has thus been scraped away, the sensation of the firm underlying musculature can be felt through the curette. The cavity is then gently irrigated or effectually sponged out, and packed with iodoform gauze.

### **Removing the Ovum from the Uterine Cavity**

Whenever it can be done, it is desirable to remove the detached ovum with the finger; but when it can not be accomplished in this way it may be expressed after the method of Hönig. The uterus is brought into a retroverted position, and the inner two fingers of one hand applied to the posterior surface of the organ, the other hand pressing against the anterior surface through the abdominal wall. Simultaneously the inner and outer hands are drawn from above downward, executing a sort of milking process on the uterus. The method can be carried out successfully even to the expression of the entire placenta, unless the cervix is insufficiently dilated, or the separated part has remained so long within the uterus as to become organized. The patient should be relaxed by anesthesia before undertaking the procedure; and if the abdominal wall is abnormally thick it would be impracticable to undertake it at all. The operation should not be made use of in the presence

of sepsis, as the squeezing and manipulation is likely to cause a dissemination of the infection by forcing it into the blood and lymph channels of the uterus. In such cases loosened parts should be cautiously removed with the abortion forceps (Fig. 236). An ordinary sponge-holder makes a fairly good substitute for this instrument, but under no circumstances should a sharp-pointed instrument, such as the gynecologic dressing forceps, be used. The risk of puncturing the uterine wall with it is too great. Under the direction of two fingers of the left hand the abortion forceps is passed into the uterus to about half its length, opened, closed, and withdrawn (Fig. 237). Generally this fetches with it the loosened ovum, but it may take two or three such trials to bring it all away. It is well, however, to feel within the cavity with the finger after each time to ascertain if detached portions are still remaining. When the embryo is large, it is difficult to remove it

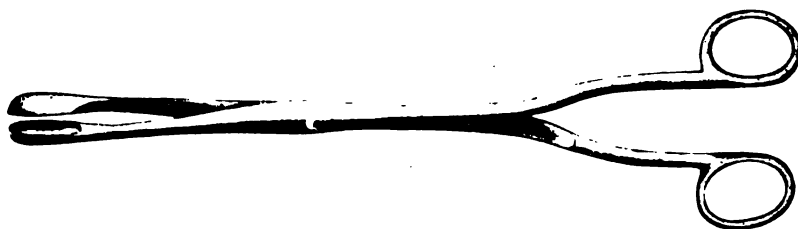


Fig. 236. Winter's abortion forceps.

with the fingers, especially if the cervical canal is but partially dilated; the abortion forceps then fills the need. With it one can grasp any part that presents and, if the cervix is well dilated, the intact fetus may readily be brought away.

An essential part in the management of abortion is to find out what caused it. This means a careful inquiry into the history of the case, careful pelvic palpation, serologic tests, and microscopic and bacteriologic examination of the aborted ovum. Only when studied in this way can one expect to find a way to avoid recurrence. Antiluetic treatment, the correction of malpositions, the reparation of cervical tears, and the cure of an endometritis are some of the remedial measures to be undertaken.

A simple abortion requires little after-treatment, involution being practically complete at the end of a week. The length of time the patient should stay in bed depends on the individual. Gener-

ally speaking, a week's rest should be enough. The next menstrual period will occur in four or five weeks, and usually is somewhat stronger than usual. The prognosis is not unfavorable, except in cases which have become infected.

Lacerations of a serious character may occur with the dilatation, especially if undue force is employed; but very much more serious are the injuries that come with the cleaning out of the uterus. The finger alone can hardly do much damage, and most of the penetrating wounds come from the use of metallic instruments, espe-



Fig. 237.- Extracting the ovum with the abortion forceps.

cially the curette and dressing forceps. A puncture accidentally made in an aseptically performed operation, is not particularly dangerous, and, except in the presence of infection, heals without reaction in a few days. To perforate a septic uterus, however, would be very serious. Therefore, in dealing with lacerations and perforations, the history of the case becomes important, since so many and more serious conditions come into consideration if the operation is unsurgically performed. As compared with a puerperal infection, a septic abortion is not so greatly to be feared.

## CHAPTER XXXI

### ASPHYXIA OF THE NEWBORN

Asphyxia of the newborn is, in most instances, a continuation of intrauterine asphyxia. There are two grades, distinguished as *asphyxia livida* and *asphyxia pallida*. The first is the more common and the less serious. In this form the skin of the whole body, especially of the face, hands, and feet, becomes blue; the heart action is slow but regular; and respiration is shallow or stops altogether. In the second and more severe grade the child has a death-like pallor, and instead of the blood finding its way to the surface, as in blue asphyxia, it remains for the most part in the internal organs. There is a further difference that in the former variety of asphyxia the reflex excitability and muscle tone are preserved, while in the latter they are not. The asphyxia following an operative delivery is sometimes so mild as to remind one of narcosis; the baby breathes regularly, looks good, but does not cry out. The state is not necessarily a dangerous one, but it is suggestive of a severe cerebral pressure, which is dangerous.

If there is any probability that the child may be born asphyxiated, preparations should be made to deal with it accordingly. A table should be spread with a sheet overlying a blanket or something equally soft; and plenty of warm and cold water, a baby's bathtub, several tracheal catheters, or such a device as shown in Fig. 238, gauze, towels, etc., should be ready at hand. As soon as the head passes over the perineum, the baby's mouth and pharynx should be wiped out so that it may not aspirate with its first breath any of the mucus, amniotic fluid, meconium, and blood that accompany birth. If born in asphyxia, the child should be immediately separated from the mother, and laid on the table where it can be examined satisfactorily, its general condition noted, and the degree of asphyxia estimated.

In dealing with the milder forms of asphyxiation it may be necessary to do no more than hold the child up by the feet and de-

liver a smart slap to its buttocks, whereupon it will usually cry lustily. In other cases this may not be sufficient, and more stimulating measures will have to be instituted. Tubbing is partic-

ularly effective. Placed in water of 100° F. the chest of the child is flicked with a towel wrung out of ice water. The first breaths are generally rapid and shallow, but become slow and deep as the treatment goes on. Intermittent traction on the tongue will sometimes excite an inspiratory effort and, as shown in Fig. 239, may be undertaken with the baby in the tub. The throat must be kept free from mucus, and one of the easiest ways to do it is occasionally to suspend the child for a few moments by the heels. Another but more complicated method is to aspirate the throat as illustrated in Fig. 240.

**The Schultze Method of Resuscitation.**—Perhaps the best known method of resuscitating a child born in asphyxia is that of Schultze. The operator takes the baby by the shoulders, the thumbs laid on the anterior surface of the thorax, the index fingers in the axillæ, and the other fingers spread over the back of the child. The ulnar border of the hands act as a support to the head, thereby preventing it from falling violently forward in the downward, or backward in the upward, movement. The physician stands with his feet apart, the babe held in the outstretched arms. The first movement of the operator is downward and forward, the axis of the child's body assuming a perpendicular position (Fig. 241a). From this attitude the operator straightens his body to an erect posture, or, perhaps, bends a little backward, the child, which is held at arm's length, sweeping through the air nearly one-half of a circle. As the baby reaches



Fig. 238.—  
Mucus aspirator.

the highest point in its excursion, the operator flexes his elbow, whereupon the infant becomes doubled upon itself, the extremities falling upon its face and chest (Fig. 241b). The pressure of

the abdominal viscera against the diaphragm causes expiration. The attitude also aids in freeing the air passages of aspirated fluids, which may be further favored by gently shaking the baby a few times before proceeding to lower it again. In swinging the child back to the first position, the operator's arms must be placed



Fig. 239.— Making traction on the baby's tongue as the child lies in a tub of warm water. (Redrawn from a photograph by Shears.)

near enough together to keep the head from falling forward upon the chest and acting as a check to inspiration. The deep descent of the diaphragm and the dragging down of the liver act to draw the air into the lungs. When properly executed an inrushing of air to the trachea can be heard. These movements of extension and flexion should be executed eight or ten times per minute,

stopping occasionally to immerse the baby in warm water, and to make observations of its heart action, if it has begun, and to note the depth and frequency of respiration. As soon as the child begins to breathe, stimulation of the skin, as directed in the milder degrees of asphyxia, will be sufficient; but, until it does begin to breathe, the heart action continuing, the swinging movements should be persisted in. Not until this treatment, or some



Fig. 240.—Aspirating the larynx soon after birth.

other equally as good has continued for half or three-quarters of an hour without results should one despair of success.

The swinging method is not entirely free from harm. In the hands of an inexperienced or careless operator, the violence of the movements may cause rupture of the liver and spleen or of vessels, and fracture of bones. Imagine how serious might be the injury if, in throwing the child upward over the head, the operator should lose his hold! The method is too violent to use on a pre-



mature infant; the structures will not stand the strain. Nor should it be applied where there is cerebral pressure from intracranial extravasation of blood, which so often is to be observed after a difficult forceps delivery. In such cases the treatment would only tend to increase the hemorrhage. But one can not tell at once whether such a condition is present or not, and one must of necessity do the best one can. If one fears the asphyxia may be due

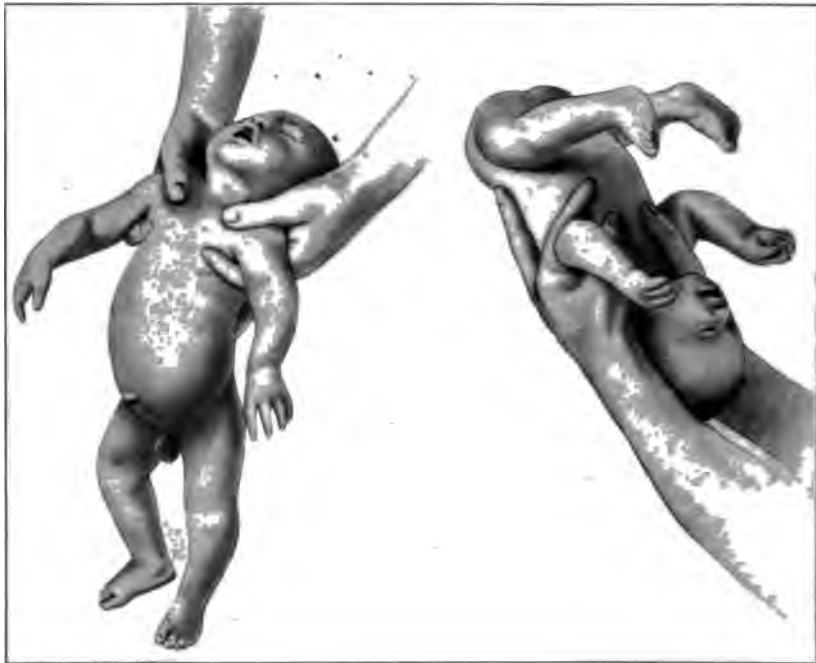


Fig. 241.—Schultze Method of Resuscitation. *A.*—Inspiration; *B.*—Expiration.

to pressure, it would be wise to make use of other and milder measures.

**Various Other Methods of Resuscitation.**—In asphyxia of the second degree (the pale state) it does little good to irritate the skin, because of the failing excitability of the reflexes. In these cases the resuscitative measures employed are more in the nature of artificial respiration. After the throat is wiped out, the index finger of the left hand is passed beyond the epiglottis into the gul-

let. Along the palmar surface of the finger and directed by it, a catheter is passed into the trachea (Fig. 242). The physician's mouth can be applied to the catheter, and the mucus withdrawn from the child's larynx by suction, but it is a little more agreeable to do it some other way. I have found that a rubber bulb attached in a compressed state to the catheter answers the purpose very well. It can be applied and reapplied at will. Before beginning artificial respiration the baby should be placed for a few moments in the hot bath.

After aspirating the trachea as described, air may be gently in-

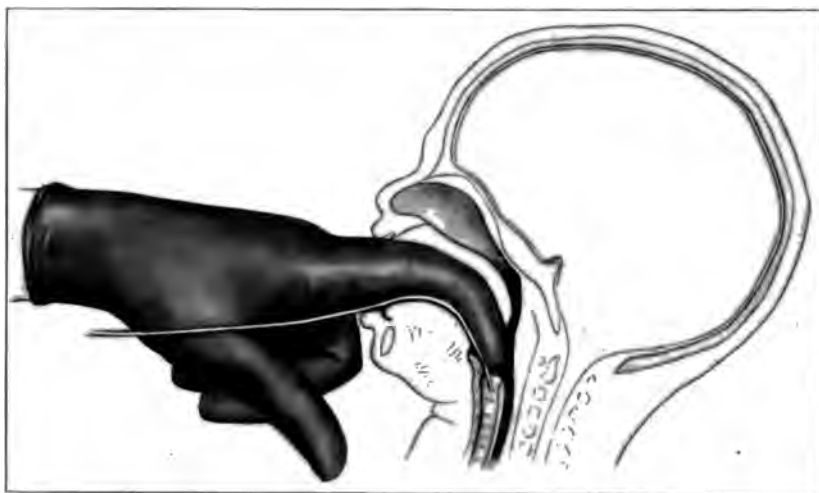


Fig. 242. -Introducing the tracheal catheter.

troduced into the lungs through the catheter, which is already in place. The thorax is then compressed lightly, and the air forced out. This may be repeated many times; but the process is not altogether free from danger, since if performed incautiously it may cause emphysema of the lungs or even pneumothorax. A more satisfactory treatment is found in the artificial respiration performed by the lungmotor or the pulmotor. Either of these devices can be adjusted to infants, and each is so arranged that oxygen, as well as air, separately or mixed, can be introduced.

In an asphyxia due to cerebral pressure, artificial respiration may sometimes awaken respiratory and cardiac action, and for a time

appear to be successful, only to fail and disappear altogether as soon as the resuscitative measures are discontinued.

The rhythmical doubling up of the child alternated by overextension; the compression of the thorax with the hands while the child is held suspended by the feet; extension of the arms above the head followed by compression of the thorax, as practiced in resuscitating an adult, are all helpful, but less effective means of stimulating respiration.

**The Lungmotor.**—In asphyxia livida it does not much matter when the cord is cut, but in asphyxia pallida it should not be done

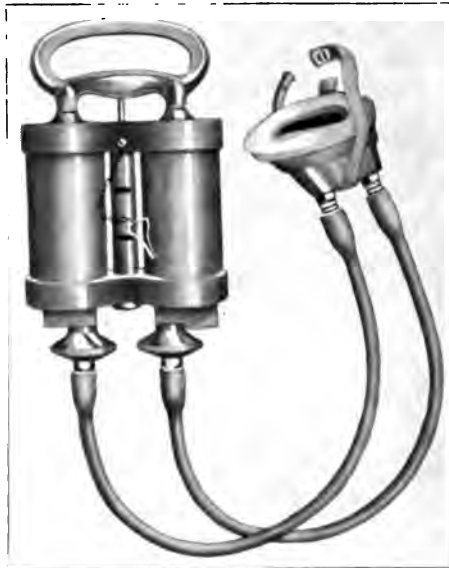


Fig. 243.—Lungmotor (infant's size).

until the pulsations can no longer be felt. The lungmotor (Fig. 243) may be put into operation immediately after the child is born, without waiting for the cord to stop beating; but the mouth, nose, and larynx must first be thoroughly cleared of mucus and blood (Fig. 244). To avoid inflating the child's stomach, its head should be drawn backward, and pressure made over the epigastrium. The first movement, that of drawing the handle out, sucks air (or oxygen, if the physician prefers), into one of the two cylinders of the in-

strument; the second movement, pushing the handle in, forces this air or oxygen into the lungs of the baby. The next and succeeding strokes of the piston fill the fresh air cylinder with air or oxygen, at the same time allowing the foul air in the child's lungs to expand into a second, or expiration, cylinder. There is no direct suction at any time upon the lungs, nor is it possible to overdistend them, inasmuch as this second cylinder acts as a safety device. Other means of resuscitation, such as hot and cold baths,

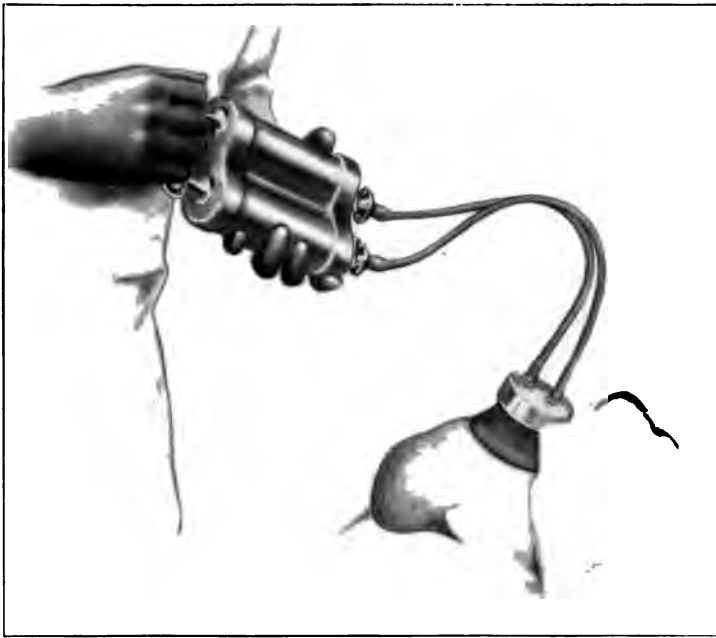


Fig. 244.—Lungmotor in operation.

rectal dilatation, stimulating enemata, etc., may be applied while the lungmotor is being operated.

A resuscitated child requires exceptional care and nursing for some hours afterward lest it lapse again into an asphyxiated state. For a few days it should be kept in a warm moist atmosphere, preferably in an incubator. Postnatal atelectasis, always to be feared after difficult and prolonged resuscitation, usually proves fatal on the second or third day.

## CHAPTER XXXII

### EXTRAUTERINE PREGNANCY

The subject of extrauterine pregnancy might properly be considered under the head of "Interrupted Pregnancy" or, possibly, as a part of the chapter on "Hemorrhages," for chronologically it would fall under either of these headings. But, since there is some question as to whether the subject should be discussed at all in a work on obstetrics, I have thought proper to place it at the end of the book as a short connecting chapter between obstetrics and gynecology.

Practically, all that we know about the surgery of ectopic gestation has been learned within the last thirty-five years. As far back as the eleventh century an Arabian physician observed parts of the fetus working their way through the abdominal wall; and in 1752 Böhmer assumed to know so much about the subject that he classified the various forms of extrauterine pregnancy. But not until Lawson Tait, of Birmingham, England, in 1883, ventured to open the abdomen in a case of ruptured tubal pregnancy, was any attempt made to treat the complication surgically. Since then it has been treated in almost no other way.

### ETIOLOGY

It is probable that every pregnancy is extrauterine to begin with, that fructification takes place while the ovum is on its way to the organ in which nature designed it to grow. Why it should become arrested in transit is largely conjectural. Anatomically, the tube itself is not designed for easy passage; indeed, it is to be wondered at that, with its plications, blind pouches, and kinks, it can be navigated at all. If we add to this condition some local disturbance, such as a slight constriction, a disturbed epithelium, or pressure from an adjoining organ or tumor, we shall not think it strange that the fertilized ovum occasionally fails to reach the uterus.

Growing in its normal matrix, the dense decidua furnishes ample foothold for the invading villi, which cease their proliferation only when the placenta becomes fully formed. By means of its trophoblast the ovum buries itself in the tissues, whether muscular, connective, or vascular. And no structure other than uterine can fulfill such demands; any other must give way to the cytolytic process of placental implantation.

While the impregnated ovum may become arrested along any part of the tract from the ovary to the uterus, the section in which it most frequently finds lodgment is the ampulla of the tube, the most expanded part of the duct and the richest in vessels.

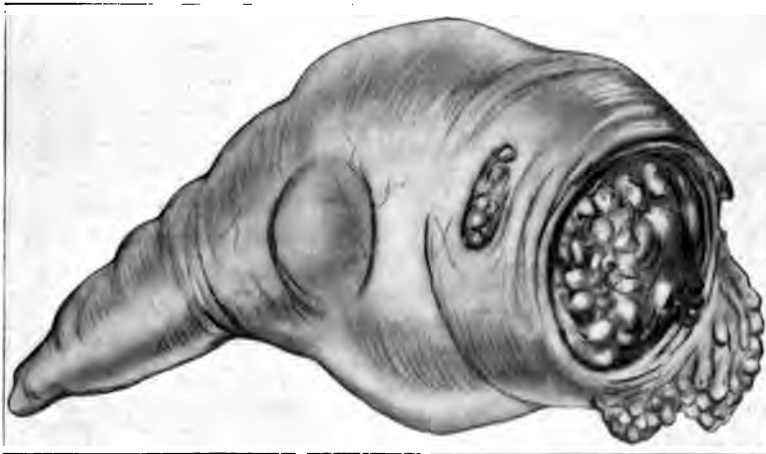


Fig. 245.—Extrauterine pregnancy—tubal abortion. The ovum is being extruded from the fimbriated extremity of the tube. (Kelly.)

### CLINICAL ASPECTS

The usual termination of a pregnancy in the Fallopian tube is not one of tubal rupture, but one of tubal abortion (Fig. 245). Seventy-five per cent of the cases are said to end in this way. The ovum may, or may not, be extruded from the tube; even its detachment is sometimes incomplete, pursuing a spontaneous recovery, even to the absorption of the embryo.

In cases in which rupture occurs, the tube gives way before the third month. The rupture is sudden and severe, is accompanied by a sharp pain in the pelvis, and is followed by an acute anemia;

the pulse becomes rapid and feeble, the skin cold, the countenance anxious. The immediate cause of rupture is usually a strain, a blow, increased intraabdominal pressure, coitus, bimanual examination, or any undue force.

The point of rupture determines somewhat the character and seriousness of the hemorrhage. If it is through the free portion of the tube, bleeding takes place into the peritoneal cavity and is unlimited; if between the folds of the broad ligament, it is held somewhat in check, and does not often become extensive (Fig. 246). In the first instance the accumulated blood is sometimes referred to as a hematocele; in the other as a hematoma. The only difference,

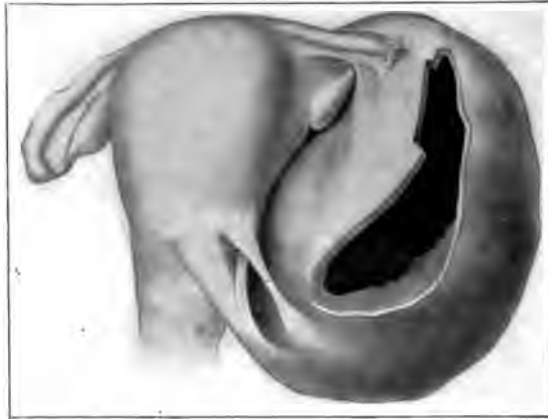


Fig. 246.—Ectrauterine pregnancy—intraligamentous. (Zweifel.)

however, is that the blood is less confined in one than in the other. A hematoma may also form when the ovum becomes dislodged but still remains within the ampulla of the tube. In this situation it is spoken of as a mole.

The tube may give way from erosion without actually bursting. A case of this kind is mentioned by Howard Kelly. A young woman whose monthly period was two weeks overdue was suddenly seized with pelvic pain; she became blanched, fell in a faint, and was immediately taken to the hospital. She was operated on soon afterward, and two and a half liters of blood were removed from the abdominal cavity; and yet all the bleeding came from a small opening surmounting a bluish red mass on the tube.

How does ectopic gestation behave if left to itself?

Sometimes the fetus continues to live after bursting from its temporary home, and takes up a new abode among the intestines, omentum, uterus, broad ligament, and bladder. The inner surface of this extemporized uterus becomes coated with fibrinous exudate, and the child goes on growing; or, possibly, the original attachment holds, the omentum and other viscera backing up the weak tube in a common federation. In either case the placenta spreads itself over such structures as come within its reach, blood vessels in its vicinity enlarge, new ones are formed, and, while wholly unsuited for the purpose, the improvised womb furnishes a fairly competent matrix for fetal growth.

In abdominal pregnancy the fetus reaches, after a time, a state of development when nature tries to throw it off. A spurious labor forces the placenta from its moorings, there is hemorrhage, and the child perishes; a conservative peritonitis supervenes, the fetus becomes macerated, the fluids absorb, the amniotic mantle shrinks, and all but the skeleton disappears. This is the usual process, but sometimes, instead of absorption, calcium salts are deposited within the sac, and a lithopedion is formed that may persist indefinitely. A case is reported in the *British Medical Journal*, December, 1913, where such a lithopedion remained in the mother's abdomen for forty-two years, during which time it caused little disturbance, and might never have been discovered had it not been necessary to operate for another trouble. A brief history of her case is as follows:

At the age of twenty-five she became pregnant for the fourth time. Everything went on well until the sixth month, when growth became arrested, the abdomen grew smaller, and all signs of pregnancy ceased; only a firm body remained to be felt in the pelvis. Upon the advice of her physician nothing was done. Subsequently she bore four children, the mass rising with each pregnancy, and returning again to the pelvis after delivery. The lithopedion, when removed, was surrounded with cartilaginous bands. The head measured eight and three-fourths inches in circumference.

Another and not unusual way for the dead fetus to get out of the abdomen is by means of infection. Pus germs gain access to it through the blood stream or through the intestinal wall, and carry it away by purulent disintegration. Exit may be through the bladder, the rectum, or the abdominal wall.

Some very strange things can happen in connection with extra-



uterine pregnancy, one or two of which may be mentioned. For example, a case has been reported in which extrauterine pregnancy occurred after removal of the uterus, the spermatozoa finding their way through a cervical fistula and germinating the ovum within the tube. Dr. H. P. Wilson, of Baltimore, in 1880, after delivering a woman easily and naturally of a living child discovered another fetus within the abdominal cavity. Being about twenty-three days short of term, it was decided not to operate till later. The following month the abdomen was opened, and a living child weighing eight pounds was delivered.

### DIAGNOSIS

At first there are amenorrhea and other signs of pregnancy, such as nausea, changes in the breasts, etc. Accompanying these symptoms, but appearing at irregular intervals, the patient suffers attacks of pain so severe that sometimes it amounts to shock, and she is found in collapse. Although there is an interruption of the menses they are likely to recur, sooner or later, accompanied by the discharge of a decidual cast (Fig. 247), large, thick, and well organized, the stroma cells of which have dense well-defined nuclei. The dysmenorrheal cast differs from it in that the menstrual cast is heavily infiltrated with leucocytes, and is much smaller in size.

While the decidual cast is of much diagnostic value, it is a symptom of extrauterine pregnancy that is sometimes slow to make its appearance. In fact, it may not be expelled until after the necessary surgical procedures have been carried out, or, possibly, not at all. Surely, its appearance should not be awaited in arriving at a conclusion.

Another condition that may be confused with a sudden rupture of the tube in ectopic pregnancy, is an ovarian cyst with a twisted pedicle. This condition may be so acute as to become very misleading, especially if it is accompanied by a hemorrhagic discharge.

Every abdominal surgeon of much experience has mistaken an inflamed tube for one of tubal pregnancy, and operated. It is also true that he has operated for pyosalpinx, and found extrauterine pregnancy. This fact shows how nearly alike in their symptoms the two affections may be.

But the mistake most commonly made is to confound extrauterine with intrauterine pregnancy, the physician imagining he has only an incomplete abortion to deal with. The character of the pain alone should be pathognomonic. In intrauterine pregnancy it begins mildly, is regular, and of increasing severity; in extrauterine pregnancy it is sudden in its onset, variable in severity, and spasmodic.

Extrauterine pregnancy is also mistaken for appendicitis, particularly if the diagnosis is made on the physical findings alone.



Fig. 247.-- Decidual cast.

But, if, in addition to the signs of pregnancy, the woman is seized with sudden and excruciating pain in the pelvis and is pale and faint, the diagnosis of a ruptured tube is quite definite. Palpation reveals very little other than tenderness. Fluid blood in the abdomen is not easily determined, and it requires a day or more for it to become clotted.

### TREATMENT

The only recommended treatment in extrauterine pregnancy is surgical, and this treatment should be used whether the tube has

ruptured or not; and the earlier the surgical interference, the better will be the prognosis. Such statements are perhaps somewhat dogmatic since some gynecologists hold that a reasonable delay after rupture may, under certain circumstances, be an advantage. But most surgeons agree that no matter what the patient's

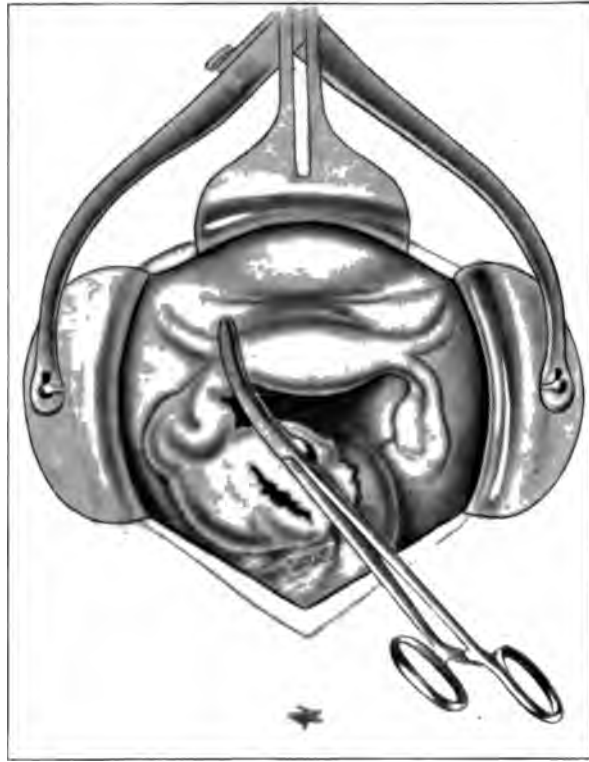


Fig. 248.—Extrauterine pregnancy; the tube on the ruptured side clamped ready for ligation and resection.

condition is, ectopic gestation is a menace, and should be obliterated at once.

In the presence of hemorrhage one needs to work rapidly. No time should be lost in more elaborate preparation than to paint the abdomen with iodine. The transverse or median incision may be employed. As soon as the peritoneal cavity is opened, free blood wells from the wound. Without stopping to inspect or ex-

plore, the fingers or, possibly, the whole hand is introduced, and both tubes palpated. Upon locating the lesion, the tube on that side is clamped close to the uterus. Then, in more deliberate measure, one proceeds to clear away the obscuring blood, and to resect the ruptured duct (Fig. 248).

Where a hematocele has formed some surgeons say that it should be removed; others, that it should be opened into from below; still others, that it should be left alone.

The last are probably nearest right since the chief danger, that of hemorrhage, is then over, and absorption goes on rapidly.

Another mooted question is, "Shall the unaffected tube be removed?" To which most obstetricians would answer, "Yes." Knowing how apt pregnancy is to follow in the other tube, it seems rational to excise it. At least the danger of leaving it should be discussed with the parties concerned.

Extrauterine pregnancy furnishes a good illustration of the difference between a physiologic and a pathologic process. Physiology implies forethought; pathology, afterthought. One is the other working to advantage or disadvantage, as the case may be. While both seek to accomplish the same end, the one follows after a definite formula, and is successful; the other struggles on blindly, and accomplishes its purpose, but imperfectly.



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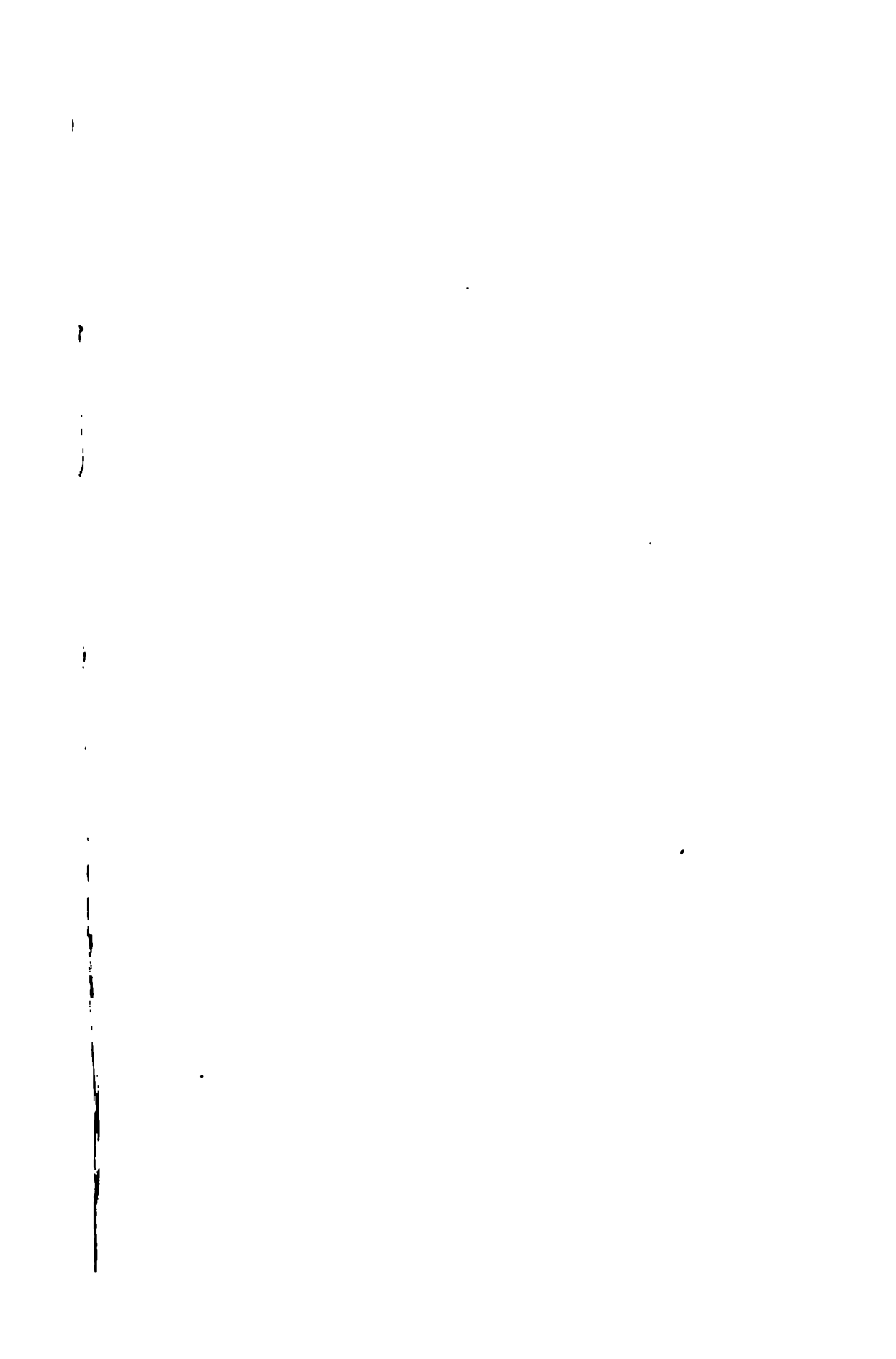
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